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SEQUELAE TO HYPNOTIC INDUCTION WITH SPECIAL REFERENCE TO EARLIER CHEMICAL ANESTHESIA

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The effects of hypnotic induction include both intended and unintended behavior, and it is the unintended, unexpected consequences of hypnosis that we are considering. The unpredicted aftereffects of hypnosis have both scientific and practical interest, the scientific interest lying in the light that is thrown upon the meaning to the subject of the hypnotic interaction, the practical interest in the precautions that are needed in the use of hypnosis in the laboratory and in psychotherapy in order to protect the participant from disturbing consequences of such participation. Some transient symptoms following experiments in hypnosis with a normal non-patient population of university students (10) led us to examine the sequelae reported within a sample of 220 non-patient university *Ss* (114 males and 106 females), over two years (1958–1960).

EARLIER REPORTS

Before turning to our own data we wish to review some of the earlier findings concerning the unintended consequences of hypnosis. Possible dangers in the use of hypnosis, particularly when practiced by amateurs and by stage hypnotists, have been noted for a long time. For example, Schultz (27), on the basis of a questionnaire study, uncovered 100 cases of health-damaging consequences of hypnosis, including such aftereffects as headaches, tremor, and neurotic and psychotic symptoms.

Most of the reports more recently published have addressed themselves to the sequelae of hypnotic therapy. Brenman and Gill (1), reviewing pertinent studies, including that of Schultz, believed the dangers of hypnotherapy to have been exaggerated. They concluded: "It would appear that in general the actual dangers of employing hypnosis are slight when the fundamentals of responsible interpersonal relationships are observed by the hypnotherapist; but there is a contraindication when the patient is on the verge of a psychosis" (1, p. 90).

Their later experience indicated marked success in symptom alleviation through direct suggestion: "Our experience with this technique since our last published summing up of its applications was largely restricted to soldiers complaining of circumscribed symptoms of recent origin . . . Thus our records contain many examples of short periods of treatment of men in a veterans hospital (10 to 15 hours) where by direct suggestion various psychosomatic symptoms have disappeared" (7, p. 340).

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They mention no undesirable sequelae. Unfortunately, no systematic studies or case reports on this material are available.

Those who have emphasized some disastrous consequences of hypnotherapy (*e.g.*, 21–24) have usually cited cases of severely ill patients, often with symptoms of varied kinds and of long duration, commonly (but by no means always) treated by incompetent therapists. The large number of successful cases without reported sequelae, and a few striking cases of damaging consequences, suggest that the present impressionistic summaries need to be supplemented by more precise definition of the total group of patients studied and the nature of the aftereffects when such occur.

Consequences in the period after leaving hypnosis are particularly relevant to the present study. Most of the cases reported are based upon the removal of symptoms through suggestions given under hypnosis that the symptoms will disappear; thus the loss of the symptom is essentially the carrying out of a post-hypnotic suggestion. Danger lies in the substitution of some other symptom for the one removed, a symptom that the patient can handle less well than the original. Appropriate statistics are difficult to locate. Extreme cases come to attention and are reported, but there is no way of knowing how representative they are. A handful of such cases can be quite impressive; even one case is enough to warn that care must be exercised in psychotherapy, hypnotic or otherwise. Some cases reported over the last few years are listed in Table 1; details about these cases are insufficient to show more than that some patients treated for their symptoms by hypnosis developed much more severe symptoms at some later time, whatever the ultimate course of their illnesses. Most of the cases had a fairly long history of illness, and the complaint that brought them to hypnosis was but one among many; this complaint was usually a form of psychosomatic or related symptom, and the most commonly reported severe symptoms that developed later were those of psychotic states. The presumption is that many of these patients would have revealed psychotic tendencies had careful histories been taken; symptom removal in patients on the verge of psychosis can deprive such patients of a major area of ego defense, and is ill-advised.

It may be noted that similar results are reported for non-hypnotic therapies directed toward symptom removal. Thus Penman (20) showed that new and occasionally severe symptoms can result when *tic douloureux* is treated by alcoholic injections in the ganglia to relieve the pain; Saul and Bernstein (25) reported that chronic weeping was converted to urticaria by threatened hospital commitment, without hypnosis; Menninger (18) described a patient in whom a successful gastrectomy for peptic ulcer was followed by suicide because the painful symptom could no longer mask a depressive tendency.

In order not to combine various aftereffects that have different origins and different meanings, we need to differentiate sequelae that are related to different phases of the hypnotic process. Unexpected behavior may occur in the induction phase, in the established state (either spontaneously or following some specific kind of suggestion), or after leaving hypnosis (spontaneously, or in relation to post-hypnotic suggestions). To anticipate some of our material at this point, we found that there may be some effects after the hypnotic session is over among those *S*s who have not entered at all deeply into the trance state. The nature of the hypnotic interaction is such that significant conflicts can be manifested at any phase, with varied meanings depending upon *S*'s history, personality dynamics, and expectations about hypnosis. While we are concerned primarily with the sequelae occurring after *S* leaves the hypnotic session, we shall illustrate some of the other effects to keep our results in context.

TABLE 1

Reported Adverse Sequelae to Symptom Removal Through Hypnosis

Subject	Original Symptom Relieved	Most Severe Later Symptom*	Reported By
38 yr. Female	Neurodermatitis	Acute schizophrenia	Joseph *et al.* (13)
49 yr. Female	Choreiform spasms and jerking movements	Many substituted symptoms, including nausea and vomiting	Seitz (29)
38 yr. Female	Bulimia (weight, 325 lbs.)	Depressed and suicidal when most symptom-free	Seitz (28)
41 yr. Male	Parkinsonian tremor following attempt to strangle boss	Murderous impulses when most symptom-free	Seitz (28)
Male	Phantom-limb pain	Schizo-affective psychosis	Rosen (21, 23)
Male	Severe leg pain	Depressive reaction	Rosen (22)
Male	Abdominal pain	Judged to be suicidal risk	Rosen (22)
41 yr. Male	Fear of flying	Personality decompensation; hospitalized	Meldman (17)
30+ yr. Female	Compulsive smoking	Overeating replaced by alcoholism	Rosen (21)
Male	Back pain following laminectomy	Committed suicide a week after symptom loss	Rosen (21)
Female	Generalized pruritus	Sexual desire for and homicidal rage against lover who deserted her	Rosen (21)
Adolescent male	Spasmodic torticollis	Overt homosexuality	Rosen (21); Rosen and Bartemeier (24)
Female	Obese; hypnotized for weight loss and delivery	Paranoid about physician who delivered her under uneventful hypnosis	Rosen and Bartemeier (24)
Male	Numbness in one arm	Schizophrenic psychosis	Rosen and Bartemeier (24)
45-yr. Female	Continuing back symptoms after injury	Paranoid psychosis	Teitel (30)

* The most severe symptom later reported is not necessarily the final symptom; occasionally there was complete recovery, and in other cases a return to the original symptom relieved the more serious pathology; in still other cases, the final outcome is unreported.

Some kinds of emotional outburst, and occasionally bizarre physical posturing, are reported as accompanying the initial attempted induction, particularly on the part of patients coming for treatment (7, 26). These effects, common among neurotic patients, are very rare in our non-patient student population; we have seen only two instances of crying (male *Ss*) within the samples studied thus far, and have had none involving fainting, exaggerated breathing or tachycardia, although we have seen these reactions in other cases under other circumstances.

Various unexpected or unsuggested effects are reported within the established state apart from any specific suggestions (5). Changes in body awareness, in modes of thought, release of emotion, spontaneous motor expression, have all been reported, sometimes characterized as alterations in the state of the ego (2). Occasionally *S* goes into a sleeplike state from which it is difficult to rouse him (12).

Specific suggestions within hypnosis may result in the appearance of side-effects. Turner (31) reported the case of a 40-year-old secretary who participated in an experiment on hypothermia under hypnosis. When the suggestion was made that her body was becoming cold she had a heart pain and reacted violently to it, clutching

at her heart. This apeared to be an anginal attack. She recalled how, as a child, she had been caught in a blizzard and had nearly frozen to death. The hypnotic suggestion of lower body temperature had reintegrated the feelings of this earlier experience.

A post-hypnotic suggestion may also result in symptoms that develop when the post-hypnotic suggestion becomes activated. One such case, described as a miniature psychotic storm, was reported by Brickner and Kubie (3) as the accompaniment of a simple post-hypnotic suggestion that produced a superego conflict.

In summary, various things happen within induction, in the established hypnotic state, and after hypnosis, some of which can and some of which cannot be accounted for directly on the basis of the suggestions the hypnotist gave the subject or patient. When therapy is involved, the dynamics of the therapy are superimposed on the dynamics of the hypnosis, and there is no way short of further investigations to determine what to assign to hypnosis and what to assign to the therapeutic intervention. Careful studies are needed in which entire samples of subjects or patients are studied with the necessary controls to determine and to understand the effects that are attributable to hypnosis itself.

SEQUELAE WITHIN A NON-PATIENT SAMPLE OF STUDENTS

The student sample studied consisted of a run-of-the-mill selection from students enrolled in introductory psychology at Stanford University. They served in the hypnotic experiments as part of the course requirement that called for participation in experimentation for a given number of hours; while the *Ss* thus "volunteered," they did so under a kind of social pressure that produced a sample quite different from that produced by those who seek out hypnotic experiences for their novelty, or who come for hypnotherapy.[2]

Our present study departs from the hypnotherapy group of cases in two major ways. First, the experiments did not involve therapy. What belongs to hypnosis is therefore separated from what belongs to treatment for symptoms. Second, enduring post-hypnotic suggestions were not made to *S*, as is usually the case in symptom removal. When sequelae do occur, therefore, they are not appearing in combination with directly suggested post-hypnotic phenomena.

All *Ss* had follow-up interviews within a day or two of the hypnotic induction; in addition, we invited all *Ss* to report back if there were aftereffects that they noticed later. When sequelae were reported, *Ss* were seen again in brief psychotherapy (usually non-hypnotic). Examples of comments by those whom we have classed as having disturbing sequelae include: "I was 'in a fog' for one hour." "Things were hazy and vague for four hours." Another *S* continued to be drowsy, felt ill the night after the first induction, and returned the next day in a state of acute anxiety over continuing the experiments.[3]

The cases who reported any aftereffects attributed to the hypnotic induction or the hypnotic experience are summarized in Table 2. The 17 cases located among the 220 represent 7.7 per cent of the total; of these, only five (2.3 per cent of the total) had sequelae that were intense for a few hours, at most for several weeks; none persisted. No reaction was of psychotic intensity. The results in this student population support the view that, while a routine experience of hypnosis is generally harmless, the experimenter (or therapist) should be

[2] We have also a true "volunteer" sample from the student body, replying to an invitation to hypnosis that appeared in the student newspaper. This sample differed strikingly from that enlisted under the arrangements of laboratory participation for course credit; the difference between the laboratory sample and those who come for hypnotherapy is an inference from the experience of others and is not based upon a sample in our laboratory.

[3] We wish to express our gratitude to those students whose willingness to participate with us in this quest for the causes of their varying reactions to hypnosis and whose thoughtfulness in the course of that search made this study possible.

TABLE 2

Sequelae to Hypnotic Induction Among 220 University Students

Cases in Descending Order of Susceptibility to Hypnosis	(Possible = 24) Two-day Hypnotic Score	Disturbance Intense for Several Hours or Long Continued	Transient Headache After Session	Dream Attributed to Experience*	History of Unusual Reaction to Chemical Anesthesia as a Child
More highly susceptible					
Case A	24			X	X
Case B	23	X			X
Case C	23	X			X
Case D	19		X	X	—
Case E	18	X			Never anesthetized
Case F	17		X		X
Case G	16			X	—
Less susceptible					
Case H	14			X	X
Case I	14			X	X
Case J	11		X		Unknown
Case K	11		X		—
Case L	10			X	—
Case M	10			X	X
Case N	10	X			X
Case O	6	X	X		X
Case P	5		X		—
Case Q	3		X		X
Total cases	17	5	7	7	10 (X), 5 (−), 2 other
Per cent of sample ($N=220$)	7.7	2.3	3.2	3.2	

* No suggestions pertaining to dreams occurred in the induction.

alert for possible aftereffects. It should be noted again that our experiments did *not* involve treatment (hence no symptom removal), and no post-hypnotic suggestions were given that were not removed before *S* left the hypnotic session. Thus, precautions were taken against sequelae, and yet some occurred.

Table 2 yields several items of information beyond the frequency of sequelae. For one thing, the relationship of the sequelae to depth of hypnosis achieved is very slight. While three of five of the more profound reactions were among more highly susceptible *Ss*, two of these reactions were among only slightly susceptible ones, as measured by scores on the Stanford Hypnotic Susceptibility Scale.[4] Headaches were reported more often and dreams were reported equally often by the less susceptible *Ss*. For this reason we have attributed such sequelae to the interaction of induction, rather than to the experience of the established hypnotic state, although the distinction cannot be kept sharp, especially for the more susceptible *Ss*. Finally, we have included a column showing the tendency for a high proportion of those reporting sequelae to hypnosis induction to have had an unusual reaction to chemical anesthesia associated with surgery as a child. By an unusual reaction is meant struggling, the report of requiring an excessive amount of anesthetic, extremely disturbing headaches and nausea after coming out of the anesthetic. Because this finding lends itself to statistical study, we shall present it first before turning to some of the case material. Information on childhood experience with chemical anesthesia was available for 125 subjects. The reaction was scored on a five-

[4] The value of using a calibrated scale of hypnotic susceptibility in studies of this kind is evident. Later cases confirm the findings here—that some very slightly susceptible subjects have appreciable aftereffects. The scale, with normative data, is given in Weitzenhoffer and Hilgard (32).

TABLE 3

Sequelae to Hypnotic Induction as Related to Childhood Experience with Chemical Anesthesia

Discordant Reaction to Chemical Anesthesia	Sequelae to Hypnosis		Total Cases
	None	Some	
High	16	10	26
Low or None	94	5	99
	110	15	125*

* Excluding cases never anesthetized and those for whom information was lacking.

$X^2 = 30.4$; $p < .001$.

point scale, and only those scored at the top of the scale were considered to have had a discordant reaction to the anesthetic. This group turned out to include 26 of the 125 subjects. The relationship of sequelae to hypnosis is shown in Table 3. Of the 26 cases reporting extreme reactions to chemical anesthesia as a child, ten (38 per cent) reported some sequelae to hypnotic induction; of the 99 cases reporting more usual reactions to anesthesia as a child, five (five per cent) reported sequelae to hypnotic induction. Or, stated the other way around, ten of 15, or two-thirds of those with hypnotic sequelae for whom the information on anesthesia was available, had had unusual reactions to anesthesia as children, while with those who reported no sequelae to hypnosis, only one in seven had had unusual reactions to anesthesia as a child. This relationship, which is statistically significant ($p = .001$), appears to deserve further study.

CASE MATERIAL

A statistical finding, such as the nonchance relationship between struggling under ether and sequelae to hypnosis, alerts the investigator to search for the circumstances that bridge these events. The process is, of course, a cyclic one, for it was case material in the first place that led to the statistical analysis. In the end, the situation will be explained if the findings permit convincing predictions about those most likely to show sequelae. All students reporting any symptomatology, however minor, were seen by one of us (JRH), with interviews lasting from a single session to five sessions. Therapeutic work was directed toward understanding the reaction to hypnosis in the larger context of the student's personality which made such a reaction possible. While the prevalence of disturbances of any magnitude was slight, we believe it incumbent upon those experimenting with hypnosis to have available psychotherapeutic resources as a protection both to *S* and to the scientific enterprise. We shall now present six cases that indicate more clearly than does a statistical summary just what is going on. Three of these illustrate the direct relationship established between hypnosis and chemical anesthesia; the others show a variety of symptoms with a variety of antecedents. Because some of the *S*s are still in college, they are not described in detail in order to avoid identification. We have tried to serve the cause of scientific inquiry by giving salient facts pertinent to the hypnotic situation, while safeguarding individual confidences. To some extent this restriction has operated as a limiting factor in our discussions of the cases to follow.[5]

Case 1. Joe, with three headaches in his life.

The relationship between the sequelae and earlier anesthetic experiences first came to our attention in an interview with Joe two days after his hypnotic sessions. Joe

[5] The names are, of course, pseudonyms. For convenience in referring to the cases they are numbered in consecutive order. Three of the cases are represented in Table 2, Case 1 being Case O in the table, Cases 2 and 3 being Cases N and C, respectively. The other three cases are from the same student body and were initially tested in the same way, but they did not come to the laboratory as part of the same experimental groups, and are therefore not part of the statistically defined sample.

reported: "I have had only three headaches in my life. Two of these followed operations and the other followed the last time I was hypnotized."[6] The first operation, at the age of six, was a tooth extraction for which he was given gas; the second, at the age of 9, was a tonsillectomy under ether. He reported that while on the operating table he could "still hear them counting at 50," and they gave him "three times as much ether as they had planned to." As he put it, "I wasn't struggling; I just wanted to watch." It is not surprising to learn that Joe was not a very susceptible hypnotic *S*. He scored at the 28th centile on both days of attempted hypnosis, passing three of the 12 tests on each of the days, only those tests commonly passed on the basis of waking suggestion. After the first day of attempted hypnosis he felt groggy for 15 minutes. After the second day he 1) had a severe headache which, although it lasted only 45 minutes, was sharply penetrating between the temples, "like a needle stuck between them"; 2) felt extremely disorganized for three hours, and 3) was amnesic most of the day: "If someone asked my name, I'd have to stop and figure... I couldn't even remember what was wrong with my car which was being repaired." These symptoms are interesting in terms of the last hypnotic instructions, one suggesting that *S* would be amnesic for his own name, and another suggesting that he be amnesic for the preceding tests. Joe passed neither of these tests at the time (*i.e.*, his memory was excellent).

In the course of the interview Joe was asked whether he could think of any reason why, after being so little hypnotized, he had had such an extensive after-reaction. He was thoughtful: "I usually am in control. I wanted very much to be hypnotized. Perhaps I wanted to be hypnotized enough that when there was no one forcing me I slipped into it. I have a notorious history: if anyone forces me, I *won't*, or I do the opposite. I would have liked to do the hypnotizing myself, with no one forcing me into it... In childhood, I could produce a similar state in myself by concentrating... I was an only child; we made many moves so that I often didn't have friends to play with. When I was alone, I'd experiment—I could think so hard that the noises outside would sound distant. I called it self-hypnosis. I also experimented with how I felt under drugs."

We see in this unusually lucid statement intense, conflicting motivation: a strong desire to experience hypnosis, and an antipathy to force from outside authority. Joe later amplified his statements about his doing nothing, or doing the opposite when his parents told him to do something; even if he knew quite well that the opposite way was very bad for him, he would go ahead.

Let us turn now to a brief description of Joe's reactions to anesthesia. With the gas at age six he experienced disorganization, people spinning around, coming closer or going further away; afterward he had a headache for 24 hours. As already mentioned, he required three times the usual amount of ether for the tonsillectomy at age nine, and the severity of his subsequent symptoms may be related to this excessive dosage: "I felt really bad for two days. I felt the aftereffects of the anesthetic for three days more—upset stomach, headache, and couldn't see well." The year before hypnosis he had had another anesthetic experience, this time with Pentothal Sodium in connection with oral surgery; after this he had no headache, but slept for 24 hours.

When asked if he could think of reasons why his reaction to anesthesia and hypnosis might be similar, Joe replied that it was "'... not wanting to lose control, my love of

[6] Another case made a similar direct and unsolicited connection between an isolated earlier experience (non-anesthetic, however) and a headache after hypnosis. This was a female *S*, whom we shall call Irma, who said, "I have had only two headaches in my life, one when I was suffering with high temperature when I had polio, the other after the first hypnotic session."

freedom." We suggest that this statement focuses the present conflict as it did the earlier conflict over the anesthesia. Is there also an element of redintegration? Does the submissiveness demanded by hypnosis remind *S* of the submissiveness demanded by the operations when he was a child? The fear and conflict, the marked reactions of headache and disorganization of those days were very likely reinstated by gross similarities between the two situations.

Joe's is essentially a struggle over induction ("to be or not to be hypnotized"), and his post-hypnotic symptoms stem from this phase of the hypnotic process.

Case 2. Howard and the fantasied giant hypodermic syringe.

A dramatic illustration of the actual reliving of an earlier experience with chemical anesthesia was provided by one male *S* who had an anxiety reaction after his first experience with hypnosis severe enough that a few minutes after leaving the laboratory he came back for help. He was reassured by one of us (ERH), and an appointment was made for follow-up interviewing by another (JRH). No additional sequelae were reported, but in the later interview *S* gave an account of what had happened within hypnosis.

Howard said he came to hypnosis with an attitude of great skepticism but no uneasiness. To him it was all "hocus-pocus." The female hypnotist, Mrs. M, helped him overcome his skepticism much more than he had ever intended, and he found himself feeling extremely drowsy. What troubled him most: "I kept seeing a rolling form like you would experience if you had been washed under a large wave. A blackish, cylindrical form, vaguely cylindrical. The cylinder was always in this direction [*S* demonstrated], swirling, rotating on its axis, these grays and black mixing. Tumbling, rolling, as though being rolled on a wave." He showed the size of the cylinder, which was about one and one-half feet long or possibly more. After describing the cylinder, he said suddenly that he had forgotten to tell Mrs. M that he was *still drowsy after she told him to wake up.*

Later, in reply to the routine questions about anesthesia, *S* told of having broken a leg in a fall at age 13. In the course of having the fracture set he had had two hypodermics. He had perceived the first syringe as of normal size, and the injection had produced only dots on the ceiling and a swimming sensation before his eyes. He had needed an additional amount. This second syringe he recalled perceiving as a "syringe two feet long and six inches in diameter. The last thing I could remember." The hands holding the syringe were distorted in size—very large. When Howard was asked if there were any parallels in the hypnotic experience, he mentioned the "cylindrical body . . . it was vaguely in the same position, sloping down towards me." Quite surprised as he continued the comparison, he concluded that the cylinder he saw in hypnosis was the same size as he had perceived the second hypodermic needle: "Both were about 2 feet long. I was on my back and only saw it . . . approximately the same proportions . . . approximately the same angle . . . the right end of the cylinder was not well defined."

In retracing our steps, we find great interest in *S*'s associations after he had first described the cylinder. He noted he had continued to remain drowsy after the hypnosis was over. Was this related to the way he had remained drowsy after his experience with the second syringe at age 13? He also described the hypnotic cylinder in terms of its tumbling around, on and under waves; to denote his state of equilibrium at the time of his second injection, he had used the phrase *swimming sensation*, which can so clearly be related to waves. As to both his initial surprise at seeing the similarities and his later conviction about the similarities, there is little doubt that this was a genuine redintegrative experience. Howard's mother, who had been with her son at the time of the

operation, confirmed his account of the earlier experience when we asked her to come in for an interview.

Part of Howard's conflict which he brought to the anesthesia-operation situation and to the hypnosis involved his rejection of outside control. He and his mother spoke of his extreme stubbornness. When he came to hypnosis he had no intention of being hypnotized. We hypothesize that two circumstances changed this picture: 1) He found the hypnotist, Mrs. M, a warm and motherly person. (As an only child, according to his mother, he had been "petted and spoiled.") 2) As he relaxed, the hypnotic situation received powerful reinforcement from that earlier situation of passivity when the second hypodermic had insured his co-operation. As the visual image of this syringe recurred he relived the coercion, with resulting drowsiness and feelings of panic.

The case mentioned earlier, where hypothermia redintegrated an experience of near-freezing in childhood (31), shows similarities to Howard's. One *S* in our series had a reaction associated with an earlier loss of consciousness caused by heat exhaustion. Some years before, Ann had experienced yellow waves while prostrated with heat. During the hypnotic experience she saw these same yellow waves but, unlike Turner's case, did not relive any change in temperature.

Case 3. Dorothy, with hysteroid symptoms as sequelae.

Dorothy illustrates the spontaneous symptomatology which can ensue when motivation for hypnosis is high enough for it to take place in an *S* who ordinarily does not relinquish control. The material suggests a relation to earlier anesthesia.

Dorothy showed marked symptoms issuing from her submission in the established state: complaints of hysteroid symptoms after hypnosis, including occasional dizziness and numbness in arms and legs when lying down.

As Dorothy participated in some of the advanced tests the hypnotist noted that, when he reached the count of 15, she reacted with nervousness. Afterward, in the interview, she showed confusion as to the counting that had actually been done. Asked later about operations, Dorothy replied that at age six she had had a tonsillectomy with ether as the anesthetic. When she was told that she should try to reach a count of 20 she tried very hard but "got to 15 or 16, went off and remembered nothing." This experience has recurred to her many times since, how she *tried* to reach 20 and got only as far as 15 or 16. She has been told that while under the anesthetic she kicked and reacted so violently she had to be held down. Her preparation for the tonsillectomy as a child involved no mention of the approaching anesthesia: she had waved goodbye gaily to her parents—then the advent of the ether took her completely by surprise.

One of the advanced tests was hand anesthesia. She said that, in hypnosis, "anesthetizing my hand was the most vivid of all the experiences." As the hypnotist was testing her hand with pins, she had the thought that anesthesia could "spread to my arm, other hand and arm, all over." Do we see here a generalization potential typical of ether anesthesia and not of what should have been circumscribed hand anesthesia? Dorothy, who had marked verbal facility, displayed her conflict over anesthesia in still another way: she asked the interviewer how to pronounce "anesthetize," saying that though she had used the word many times she always stumbled over it.

During the hysterical attack which followed hypnosis by a week or so, and which was in some ways related to it (but with other precipitating factors also operating), Dorothy said her major symptom was the feeling that her hands, arms, legs and mouth were becoming numb and anesthetized. We see how these symptoms carry out the thought she had had when her hand was anesthetized in hypnosis. In the fact that she added her "mouth" to the list, do

we see some reflection of the earlier operation for a tonsillectomy *via* the mouth, and the ether mask which covered it?

This *S*, coming from a home where individual freedom was emphasized and where correspondingly less emphasis was placed on discipline and conformity, had had a childhood more like our less susceptible *S*s than our more susceptible ones. Hypnosis threw her into conflict because she had to submit to authority to have the novel experiences she was always seeking. She submitted and scored above the 90th centile. In describing herself, Dorothy spontaneously mentioned how she liked to be in control of all situations: "I *hate* giving up leadership, the control . . ." When asked why, then, she let herself submit to the control of the hypnotist, she replied, "Curiosity. *Intense* curiosity about hypnosis. I wanted to *know*. In a process of thorough investigation, you experience it." This trait appeared in other situations, *e.g.*, if she was curious about mountain climbing she would see to it that she climbed the mountain even if it was dangerous and meant some risk to her life. She spoke of her will to do, the "I'm *going* to be hypnotized" attitude with which she came to hypnosis. At the time she didn't visualize the degree of loss of control: "Later I realized I didn't like it."

Dorothy idolized and idealized her father, who was a very able, forceful person; she both identified with him and was close to him. She was not interested in boys her own age—they could not "measure up." In such a setting of Oedipal attachment, hysterical symptomatology frequently takes place. The hypnotic situation, with its emphasis on the passive role and submission to a male hypnotist, mobilized sexual desires as well as defenses against them. Conflictual feelings over sex, as well as conflictual feelings over control, are reflected in the symptoms of numbness stemming from earlier experiences, including that of anesthesia.

The symptoms closely related to hypnosis were cleared through several psychotherapeutic sessions, so that there were no lingering effects of the experience with hypnosis.

Case 4. Margaret, whose later hallucinations reinstated the hypnotic suggestions.

The fact that a suggestion has been given under hypnosis, responded to (or not responded to), and then removed prior to the termination of the hypnosis does not guarantee that there is no residue from this suggestion. Margaret was disturbed the night following hypnosis by the buzzing of a fly that she knew to be hallucinatory, and by hearing someone call her name when no one was near. At the termination of hypnosis her memory for all experiences had been reviewed; she had known that the fly hallucination was one of the tests, and that in another she had been supposed to hear someone calling her name. During the hypnotic session she had reacted to the fly and passed this test, but when she was interviewed the next day she had apparently repressed this experience, for she insisted she had not reacted at all to the fly. Near the end of the hypnotic session she had heard a voice calling her name when the hypnotist was counting for her to wake up: "It seemed silly to answer, so I didn't."[7] Margaret had a need to please others and to fulfill their wishes. Her reaction to unfinished business: "I have a guilt feeling if I haven't done something I was supposed to do . . . Something must happen if it's supposed to happen." At the same time she was very reality-oriented, and the hallucinatory items threw her into conflict: she reacted to the fly, but repressed the memory of having reacted so irrationally; she reacted reluctantly to hallucinating her name as being called, and failed this test in the eyes of the hypnotist. Thus her conflict was over unfinished business, over not being able to fulfill the wishes of the hypno-

[7] The post-hypnotic hallucinated voice is part of the Friedlander-Sarbin scale that was being used in a modified form at the time Margaret was being tested (6).

tis as to items which were ego-alien because of the degree of their unreality. At one po nt, in describing her relations to teachers, she said, "At school, if a teacher told me to do something, I had to go home and do it." Is hat essentially what she did that night in re ponse to the commands of the hypnotist? Pe rseveration may occur in the midst of su h compulsivity. After this interview, *S* w s hypnotized again, this time by a senior st ff member, and was told that she had fu ly completed the job, to her satisfaction an l to ours. When seen later she had had no return of symptoms.[8]

Case 5. Barbara, who found herself growing smaller as she left hypnosis.

Barbara participated in the pre-test of another scale that included an age-regression item. She failed to respond to the suggestion to regress within the hypnotic state but, returning home after the hypnotic session, she suddenly imagined that her body was shrinking in size. In an interview the next day she described it in the following terms: "I had an actual physical sensation of shrinking. It seemed odd that the objects around me stayed constant. The change in my size was so real that I thought the objects should change too." She had shrunk to about half her actual size and she *felt* somehow that the angles of the roof and other objects around her should be viewed through the eyes of a small person; instead, she was still looking at the objects around her from the angle of one who was tall. She found this shrinkage and incongruity an upsetting experience, tried to turn it off, and discovered that she could. Then she decided it had been so interesting she wondered if she could turn it on again. Trying, she immediately became half size. She alternated a few times. At the very end she became dizzy and felt some loss of equilibrium. The whole experience lasted about three minutes.

What thoughts preceded this episode? When *S* was asked this, she replied that, just before this experience occurred, she had been thinking of the hypnotist's question as she finished writing her name. She had been asked to write as though she were back in the second grade: "He asked me if I had become any smaller. I hadn't then, but maybe I did it later."

In this *S* there was a conflict between being very responsible and being a carefree child again. At home, as the protected child of much older parents she had been asked to do very little, and much had been done for her. Good grades at school in a small community had come easily. At college, adjustment had been more difficult, and winning friends and making good grades took more effort. She was trying to make that effort and to be responsible. At the same time the wish to regress—*i.e.*, to return to the easier life of childhood—was a strong one. The defenses against such regression had been built up as *S* had realized the necessity for being on her own.

In the overall regression demanded by hypnosis, Barbara responded in only moderate degree, scoring at the 50th centile for the test as a whole. We believe that the specific demand for age-regression touched her intense wish in a way she was unable to resist. Hence in her subsequent unconscious response to the hypnotist's asking her if she felt smaller, she relived briefly her wish to be a little girl again.

Barbara's experience represents both perseverative and redintegrative processes. The perseverative question (Do you feel smaller?) recurred because it had touched on a deep facet of the personality; what was redintegrated was not a specific experience but a way of life (being a child again).

Case 6. Dick, with panic during induction.

The case of redintegration which we report now is of more than average interest in

[8] Another female student, Ellen, driving her car home alone from a hypnotic session in which, although fully co-operative, she had not shown herself to be a very good *S*, was troubled by the voice of the hypnotist talking to her as she drove; she slept for several hours after reaching home.

our series because of the emotional outburst which occurred during the induction phase. Although we catch glimpses of symptomatology related to induction in the sequelae that have here been our primary concern, we rarely see symptoms during induction in this group of non-patient college students. Dick was a member of the special "volunteer" sample mentioned earlier. When the hypnosis followed a standard procedure with suggestions that the eyes would close, Dick not only closed his eyes but shut them very tightly, became markedly tense and began to shed tears. Sighing, moaning, sobbing, clenching his hands into tight fists and setting his jaw followed in rapid order. When roused from the state he immediately calmed down, associating his reaction to "fear or some sexual reaction." Although the session was carried through to completion with his willing co-operation, he was unable to re-enter hypnosis, and failed to respond to the hypnotist's specific suggestions.

Dick told the interviewer, "I really wanted to be hypnotized. He [the hypnotist] says, 'Relax,' and I'm tense. I kept thinking, 'What if this doesn't work . . .' He says, 'Your eyes are closing' . . . and I felt relief that they *were closing. But they kept on closing tighter and tighter* . . . I thought, 'I'm not going to do it.' It was such an intense emotional experience." When the hypnotist asked him what it felt like Dick said he didn't know. One thought was of sex, another was of fear . . . "When you're *really* frightened." Dick continued in an associative way to say he used to be so frightened of spiders. This hypnotic experience reminded him of experiences "when you're so frightened you can't move."

After further discussion he was asked about times when he had been disciplined. As he talked, it was as though a light dawned. The stance which he had assumed in hypnosis was like that when he had tensed, expecting the blows of his mother. As he sat in the chair in front of the interviewer he tensed his face, body and hands the way he always had when her blows were about to fall or were falling on him. His eyes were closed tightly with the utmost effort, his jaws set and his hands clenched. He tried it several times. "Just the way I was in hypnosis," he said in a startled way. He described the beatings: "You stand there, you're really mad, you can only get beaten. First would come the tensing. I'd be caught in a corner and there'd be no time to run." As a boy *S* had always tried to run away, but this usually had been impossible, since his mother waited and cornered him. The father had been a stern disciplinarian but did not corner him as his mother did.

When the interviewer returned to Dick's early statement that the hypnotic experience reminded him of sex, he was puzzled, and said it had been a passing thought he couldn't explain. In a number of subsequent interviews with this *S* it became clearer that the sadomasochistic relationship between parent and child, as reflected in the beatings, was recognized unconsciously as combining love and hate. His mother started the severe punishment, but Dick came gradually to be provocative to have this attention, which was a major source of her interest. He described the situation when he was older: "If my parents told me to do something and I didn't want to, I would say, 'No.' They said, 'Yes.' I might say, 'You can hit me but I'm *not* going to do it.' Then I'd get hit."

The induction procedure of being expected to submit to the domination of another person while seated in the corner of a small room reinstated a large segment of past experience vis-à-vis authority. With a faithful reproduction of reactions to authority shown as symptoms, this case adds to our knowledge of how the induction phase may represent primarily a conflictual response to authority.

DISCUSSION

Much of the work in our laboratory has been guided by a general developmental-

interactive theory (9), according to which we have sought to show, on the one hand, continuities between early childhood history and what happens in the present within hypnosis, and, on the other, what it is about the present hypnotic interaction that results in the phenomena we observe. In another series of cases (11) we have shown some of the childhood experiences that are conducive to hypnotic susceptibility; some similar considerations bear upon the occasions for sequelae. As the case reports have indicated, sequelae result primarily from conflict between opposing tendencies. Because the specific aberrant responses are often traceable to childhood experiences, we gain some support for the more general theory that typical responses within hypnosis may also be traced to experiences from childhood.

Conflicts resulting in sequelae include those that arise in the induction phase and those that arise in the established state. Distinguishing features of the induction and the established phases have been emphasized by many writers (7, 14, 15). Consequences may be found at any time, either within hypnosis or after the session is over, as the above cases have shown.

The induction phase in relation to sequelae: The induction phase involves the gradual relinquishing of control to the hypnotist, which brings to the fore whatever unresolved problems the person has with respect to authority. If there is some resentment of or resistance to authority, this opposes the accepted contract to co-operate with the hypnotist, and the resolution of this conflict can take several forms: failure to be hypnotized, symptoms within induction, or sequelae. The symptoms may arise as redintegrations of childhood experiences of which the circumstances of hypnosis serve as reminders; this is one meaning of the regressive transference within hypnosis.

Let us examine the kinds of experiences observed within the induction phase a little more closely. First, with a non-patient sample of university students the induction phase is usually uneventful. This means either that the authority conflicts are not severe, or that the conflict is resolved through not becoming hypnotized and without guilt about the failure. Second, those who in this population do become disturbed in the induction phase have generally been shown to be reliving some earlier conflict with authority, or some overpowering experience that evokes fear. Among the cases are those of the boy who defied authority by not becoming hypnotized, as he had defied authority by not going under to a normal dose of ether; he then proceeded to have the experience he wanted by hypnotizing himself after the session was over. The boy who reacted with clenched fists and tears reinstated his defiance and fear of punitive parents who cornered him, as he was now cornered by the hypnotist.

There are many subtle relationships here that call for a more detailed theoretical treatment at some later time. Childhood omnipotence becomes curbed or handled in various ways, and these resolutions are likely to be reflected in hypnotic induction. To some extent the curbs imposed by authority within initial induction are situational and not personal, so that, no matter who the hypnotist is, there is a kind of immediate readiness to react with familiar patterns—what Macalpine (16) has called a "transference readiness." When the induction phase proceeds without conflict, it may have one of several outcomes: if the subject is afraid of becoming passive or submissive, and has no strong need to become hypnotized, then he is comfortable to find that he cannot be hypnotized; if he is unconflicted about seeking a passive relationship, he may become hypnotized and enjoy the indulgence of the hypnotist's attention; if his desire for new experience is strong, and he has no doubts about his own powers, he may turn hypnosis into an adventure in which he makes the hypnotist his servant in leading him into experiences that transcend the nor-

mal. Thus no one kind of person is susceptible or insusceptible to hypnosis, and the hypnotic state does not have the same meaning to all hypnotizable subjects.

The question can be raised as to why neurotic patients coming for psychotherapy, in contrast to our group, are reported to show a high frequency of disturbance during induction. Perhaps a conflict is engendered between strong motivation to submit for the sake of symptom relief and long-standing attitudes against authority. We consider this a possibility, too, in the psychiatric resident group with whom Gill and Brenman (7) worked. They mention that emotional reactions were particularly apt to occur in residents who were seeking some benefit, such as a psychoanalysis. The motivation for hypnosis of these *Ss* may have been heightened by hope either of help with personal problems, or of help toward professional advancement (psychoanalytic training being at a premium); this motivation, conflicting with their attitudes toward authority, then may have given rise to such emotional upsets as crying as they attempted to curb their resentment over the submission. In our systematic sampling, students were rarely motivated by circumstances over and above the credit received as a laboratory requirement for a definite amount of time—so we were not dealing with special pressures to overcome their natural inclinations. Mild conflictual reactions, instead of showing as responses during induction, can be postponed and appear afterward in the form of headaches or dreams.

As already indicated, some *Ss* handle the conflict over induction by not becoming hypnotized, thus retaining control. Others make a smooth transition to the hypnotic state, possibly through some kind of dissociation or fractionation of the ego. Still others show compromise reactions, of which the sequelae we report may be an indication. Sequelae are not the only defenses against hypnosis —*e.g.*, one boy who reported that at age six he had required a double dose of ether also failed his first appointment. Another asked innumerable questions of the hypnotist and thereby retained control. We reported the case of the boy who reacted by resisting hypnosis, but hypnotized himself later, showing mild sequelae.

We are making the interpretation that the induction phase is responsible not only for events observed within induction, but also for sequelae that follow rather unsuccessful inductions. For example, the dreams reported as an aftermath of hypnosis were frequently those of *Ss* slightly or, at most, moderately hypnotizable. In the two initial sessions no suggestion was made to dream during hypnosis or post-hypnotically. For the most part, the students who related their dreams to hypnosis had these dreams on the following night or nights; one *S*, however, fell asleep after returning to his room immediately after hypnosis and had such a vivid dream that he came back to the laboratory to tell us about it. The transference and regressive features of these dreams are striking, and are consistent with the interpretation that the attempted hypnotic induction stirred up early conflicts relating to authority (parental) figures. One student began to dream again of a dead father about whom she had not dreamed for several years; another dreamed about nearly-forgotten grade-school events. Another *S* reported that a recurrent childhood dream had suddenly reappeared after hypnosis: "I dream that I am blind, but can distinguish slight degrees of light around the edges of solid forms. I can't stand up and nobody will help me." It is interesting to conjecture that any weakening of repression would show first in dreams, because regressive experiences are best tolerated there. The highly hypnotizable *S*, able to tolerate submission and regression, does not require a dream to deal with what was stirred up in the induction; the less hypnotizable *S*, resisting hypnosis despite his desire to cooperate, is left with unfinished business which may motivate the dream.

The established hypnotic state in relation to sequelae: The established hypnotic state represents one resolution of the conflicts stirred up in induction, and even those who go through a period of disorganization, uncontrolled affect and disorientation may achieve a new and satisfactory integration within the established state. This is described by Gill and Brenman (7) as the formation of a subordinate but integrated ego structure, a subsystem within the ego. New conflicts may, however, be stirred up within this state. Some of them take the form of conflicts over reality orientation, as the hypnotist suggests departing widely from reality, either as perceived cognitively (*e.g.*, positive and negative hallucinations), or as interpreted morally (*e.g.*, in violation of conscience or acceptable social conduct). The student of Brickner and Kubie (3), told to violate a simple social convention, resisted for 34 minutes after arousal from hypnosis. During this period he experienced nausea which, however, cleared as soon as he completed the post-hypnotic assignment. The authors observed that parents operate as unwitting hypnotists, giving commands that the child incorporates as an internal "must" system. When the hypnotist makes demands that run counter to these early superego figures, the result is a conflict, with concurrent symptoms. In the regressed state some defenses are weakened, and suggestions to regress in age or to recall early memories may revive traumatic experiences. The continued passive-dependent relationship to the hypnotist is also likely to stir up sexual anxieties, overt or covert, especially among those troubled about passivity.

The problems activated by the specific suggestions within hypnosis are often rather obvious, as when *S* relives emotionally an early traumatic experience stumbled upon more or less by chance (*e.g.*, Turner's *S* who had once been terrified by near-freezing and had anginal symptoms following suggested hypothermia). One of our *Ss* was greatly troubled by having been permitted in age-regression to play again with a pet dog that had been lost in her childhood, because the experience was cut short and the dog taken away from her as abruptly as before. The conflicts stirred up by the general nature of the hypnotic relationship are more difficult to assess, and it is these upon which the sequelae sometimes throw light. Case 4 in our series had the kind of reality-orientation that made her reject the hallucinatory experience while in the established hypnotic state, yet produce it when alone at home because of the other pole of her conflict: the need to please. A second *S* (Case 5), because of her fear of her need to regress, failed to regress in age in response to suggestion in hypnosis, yet found herself becoming child-sized when she left the laboratory. A third *S* (Case 3) reacted with thinly disguised sexual responses after the sessions were over. We believe that these responses represent later resolutions of conflicts engendered within the trance state by the nature of the relationships there; several *Ss* made responses after the session ended that reflected specific suggestions made within the hypnotic state. These responses, delayed until the session was over, could just as well have been made within hypnosis except for the conflicts over interpersonal relationships that were heightened in the midst of the hypnotic state.

While psychodynamic concepts have been used in describing what was happening within induction and within the established state, most of what has been said could equally well be translated into the language of learning theory. The main point is that there is continuity between early experiences, later experiences outside hypnosis, and those evoked within hypnosis. If these other experiences are considered to be habits or memories, the likelihood of their reinstatement will depend upon similarities between the present situation and those earlier situations in which the responses occurred. Our specific findings—that difficult experiences under chemical anesthesia tend

to be associated with troubles within and following hypnosis—can be explained partially on this basis. Redintegration, explained in terms of learning theory, requires that an *S* capable of these experiences be presented with cues similar to ones to which he has responded in the past; then there is a high probability he will respond similarly in the present. The experience of chemical anesthesia accompanies surgery, and the combination is no doubt a frightening experience for a child. We need to study in more detail the critical ages when such experiences prove disturbing, and to gain more information about the operation, the preparation for it, and the outcome.[9] We need to find ways of determining to what extent the connection between these experiences and hypnosis rests upon a common personality background brought both to surgery and to hypnosis, and how much the connection depends upon the evoking of residues of the surgical experience itself. To the extent that some of the *S*s were extremely resistant to the chemical anesthetic, and required excessive doses, we may suppose they brought to that earlier experience the kind of resistance to loss of control that they brought to hypnosis. To the extent that the counting in hypnosis reminded them of the counting in the earlier experience, we may conjecture that some residue of that experience could be reactivated in the present. Occasionally a *S* spontaneously related aspects of hypnosis to anesthesia. One, who reported struggling against ether at age seven, described the hypnotic experience thus: "I felt lightheaded as if breathing ether."

Other experience revivals within hypnosis can be understood on the same basis. Generalized conflictual attitudes, such as those toward authority, are also amenable to understanding in terms of learning theory, as developed, for example, by Miller (19).

[9] The study of recall within hypnosis of experiences while under anesthesia raises additional interesting problems (*e.g.*, 4, 8).

We believe that our general statistical findings and the case materials, taken together, show that sequelae to hypnosis are fruitful in the search for the meaning of the hypnotic relationship to *S*. The power struggles within our non-patient population are undoubtedly milder than those that are met in therapy with neurotic patients, who are clinging to symptoms at once gratifying and disturbing. It would be highly desirable to have for a patient population the same kind of information that we have collected on a non-patient population—that is, information on degree of hypnotizability, aberrant reactions within induction, within the established state, and following hypnosis, for *all* of the cases treated.

SUMMARY

The literature on the aftereffects of hypnosis is lacking in statistical studies that relate unexpected or unintended consequences to the total population from which the cases are drawn. Fifteen cases from the literature of the last few years show that symptoms may develop after hypnotic symptom removal which are more severe than the original symptoms, a number being of psychotic intensity. They appear, however, chiefly in patients with a long history of illness, and perhaps showing psychotic trends prior to the therapy; there is no way of knowing the total sample from which they are drawn, or to what extent the consequences are determined by ill-advised techniques of psychotherapy rather than with hypnosis as such. Symptom removal by techniques other than hypnosis occasionally has similar consequences.

It is well known that collateral responses may occur within hypnosis, other than those suggested by the hypnotist. They may occur within the induction phase, within the established state (either as a general manifestation or as a response to specific kinds of suggestions), or after leaving hypnosis (whether or not related to specific post-hypnotic suggestions).

The present study is concerned with the sequelae to hypnosis in a non-patient sample of students coming to the laboratory for scientific purposes, so that neither therapy nor persistent post-hypnotic suggestions were involved. The sample of 220 *Ss* included 114 male and 106 female students drawn from classes in introductory psychology.

Sequelae attributed to the hypnotic experience were reported by 17 of the 220 *Ss* (7.7 per cent), but many of these were minor and fleeting, and none was of psychotic magnitude. The sequelae that lasted as long as a few hours were limited to five cases (2.3 per cent of the total sample). The results support the view that a routine experience of hypnosis is generally harmless in a student population, but *E* (or therapist) should be alert for possible aftereffects, and provisions should be at hand for occasional brief psychotherapy, even though the experiments themselves are not oriented toward therapy.

A specific finding was that sequelae to hypnosis were related on a non-chance basis to bad earlier experiences with chemical anesthesia, chiefly ether anesthesia in childhood. Those reporting severe nausea and headaches following chemical anesthesia, or fighting the anesthetic and requiring more than expected, had sequelae to hypnosis more frequently than did those who had had anesthetics without reported discordant concomitants. The difference between the groups was significant beyond the .001 level.

Six case histories are given, three relating the sequelae specifically to earlier experience with anesthesia, three to other circumstances. All show reactions under hypnosis that indicate dynamic similarities to personality characteristics arising from childhood experiences.

It is conjectured that the conflicts within the induction phase of hypnosis that produce either immediate or delayed symptoms are primarily those having to do with the exercise of power and the reaction to authority—hence, conflicts between the conscious willingness to be hypnotized and the unconscious resistance to or fear of the submissive role required. The individual forms that such conflicts take are highly varied.

The conflicts within the established state differ, in that the state is not reached unless the conflicts of the induction are at least temporarily resolved. The new state, which has regressive characteristics, makes *S* vulnerable to conflicts based on reality distortions (as in suggested hallucinations) or ethical-social issues (as in suggested behavior violating his moral code or superego demands). Sometimes specific suggestions revive early experiences that were traumatic or provocative of fear.

While the language of psychodynamics is appropriate in the discussion of these cases, the many redintegrative factors also suggest that learning theory can have much to say in explanation of them. Because learning theory has ways of dealing with conflict and conflict resolution, it can also encompass some of the problems discussed as conflicts over authority, commonly treated in psychodynamics as transference problems.

The many reflections of earlier childhood experiences in the sequelae, including some of the dreams, suggest the promise of a developmental theory of hypnosis.

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THE REBUS TECHNIQUE: A METHOD FOR STUDYING PRIMARY-PROCESS TRANSFORMATIONS OF BRIEFLY EXPOSED PICTURES[1]

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Unlike the methods used in most studies dealing with the perception of minimal cues (1, 15), the Poetzl technique and its modifications permit the investigator to follow the fate undergone in memory by an incidental stimulus.[4] Our purpose is to introduce a technique designed to detect primary-process changes in the memory of briefly exposed pictures. Fisher (6, 7) has identified at least ten ways in which incidental visual stimuli are changed when unintentionally reproduced by subjects in dreams. These stimuli undergo translocations, condensations and fusions, fragmentation and rotational displacements. He likened these transformations to the primary-process effects upon visual representation which Freud found in dreams (9). Pine (17) has shown that incidental auditory stimuli are represented in subsequent TAT stories symbolically rather than literally. Using a method based on the experiment to be reported in this paper, Spence (23) found that the subliminal visual presentation of words produced a variety of transformations as measured by response latency, recall and discrimination. Luborsky and Shevrin (14, 22) have reported that the meanings attached to incidental visual forms also undergo changes in indirect recall: these meanings are often shifted onto related concepts, as if the incidental stimuli "triggered off" associations (*e.g.*, a truck may appear in an image as a car, wagon or wheelbarrow).

Our interest in this topic was prompted by the psychoanalytic theory of thinking: Concepts maintain their logical character unless the person using them is under the sway of strong conflicts related to the particular ideas, or is in a changed state of consciousness such as that produced by sleep, toxicity or severe psychopathology (18). Under these conditions not only may the realm and content (21, p. 389) of concepts be affected, but also the class name itself may lose its referential character and become an auditory pattern which may suffer some of the same transformations that Fisher identified in the case of briefly exposed visual forms. Illustrating the way in which a concept may lose its referential character and become an auditory pattern is the response of a young schizophrenic patient to the task of determining on what basis a group of round items (sink stopper, bicycle bell, rubber ball, two corks and a colored disk) belonged together. He replied, "... In a home ... I suppose if I wanted to stretch things ... I don't know if it could be done ... but it would take a lot of *round-*

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[4] In this use of the term *incidental stimuli* we follow Klein, who referred to it as the "generic event," and went on to say: "The importance of a stimulus is not so much its subliminal status as the meanings and properties it acquires when circumstances relegate it to the periphery of conscious thought and attentions" (12, pp. 299–300).

about. In Europe people use bicycles as a means of transportation . . . the corks could be outside too. . ."[5] The verbal trace, *round,* had been aroused by the common characteristic of the objects, but it could not play a role in concept formation; instead, the phonetic fragment, *round,* became part of another idea unrelated to the correct solution. It should not be surprising that similar processes are present in the dreams of normal people. Freud remarked that "the work of condensation in dreams is seen at its clearest when it handles words and names" (9, p. 295). He referred to the "pictographic script" of dreams, which must be read as if it were a picture puzzle or a rebus. This "pictographic" mode of expression Freud considered to be ordered by unique rules of thought, to which he gave the name of *primary process. Secondary process* rules of thought held sway in our logical thought habits. In a systematic elaboration of psychoanalytic theory, Rapaport defined the primary process as "based on drive organizations of memory, and using cathexes which are freely displaceable and strive to discharge in terms of 'wish fulfillment' " (20, p. 694). The secondary process is characterized by "delay of discharge, detour for the sake of a safe path, full availability of memories and their use in experimental action of thought" (19, p. 59).

We assume that a briefly flashed stimulus is more capable than is a fully visible one of insinuating itself into thought processes subject to primary-process forces. This would be especially true if some aspect of the stimulus lent itself to manipulation by these forces. We devised stimuli in which there were two levels on which concepts could be related to the stimuli: a conceptually oriented, secondary-process level, and a concrete, phonetic, primary-process level. Our major hypothesis was that the phonetic relationship could be shown to function following the brief exposure of the stimuli without *S*'s being aware of this use of language either after the brief stimulus exposure or after a subsequent prolonged exposure. It was also our hope that, by using *predicted* relationships between the incidental stimulus and *S*'s responses, we could deal better with such problems as contingent associations and the influence of extra-experimental factors (5, 10).

[5] We are indebted to Dr. Irwin C. Rosen, staff psychologist at The Menninger Foundation, for calling our attention to this example.

METHOD

The Rebus Technique: The rebus, or pictorial representation of a word, meets these requirements. For our stimuli we selected two word-pictures: tie—knee (tiny) [Rebus T] and bee—gun (begun) [Rebus B]. Four pictures were cut from colored magazine advertisements, mounted and made into slides (Figure 1). When we flashed Rebus B for pilot *S*s we found that the gun was too easily identified. We shortened the barrel and mounted the gun upside down to make correct identification more difficult. The four pictures for the two rebuses were chosen to be of the same frequency of appearance in spontaneous imagery as measured by a catalogue devised for quantification of extrasensory perception (ESP) successes and failures (24). By using pictures rather than words we hoped to avoid the possibility that the partial perception of letters or letter fragments might "trigger" the verbal effects measured in the experiment.[6]

We made up a word-list to be shown *S*s which contained the two rebus words, *tiny* and *begun,* and four "clang" words: *ti*tle (related to tie), pen*ny* (related to knee), *be*sides (related to bee), and wa*gon* (related to gun). All words were equated for frequency of usage as determined by the Thorndike-Lorge tables (25).

The word-order for the six words was bal-

[6] Spence (23) adapted the *begun* rebus for use with the "masking" technique of Klein *et al.* (13). Instead of using a picture, Spence flashed the words *bee—gun.* Of the two rebuses (the other, *suck—seed*), the *begun* rebus resulted in consistent positive findings on the phonetic level.

FIG. 1. Stimulus figures for Rebus T and Rebus B.

anced so that each word appeared in all positions an equal number of times. In addition to using a word-list, we obtained waking images from *Ss*. Other studies (2, 8, 16, 22) have shown that images have been found to recover unreported parts of the stimuli. The rebuses were exposed at 1/50″. Equipment used in the experiment is described elsewhere (22). Following the exposure of the rebus, *S* was asked to describe the picture and draw it. He was then handed the list and asked to read it aloud and to rank the words in the order in which they attracted his attention. He was asked if he saw any connection between the picture and the list. *S* then described and drew two freely evoked images. He was asked if these images were connected in any way with the picture. The picture was then re-exposed for *S*'s leisurely inspection. He was encouraged to describe the picture fully, and was then asked if he saw any connection between the picture and the list of words and his images. A series of graded hints was used to explore *S*'s insight into the phonetic relationships.[7] The data were gathered in an hour-long session.

SUBJECTS

Seventy *Ss*—31 men and 39 women—took part in the experiment. Twenty-seven were associated in a professional capacity with the psychiatric community and could be considered to share the general theoretical background of the experimenters, although they were not familiar with the particular technique or specific purpose of the experiment. The remaining *Ss* were chiefly non-

[7] Verbatim instructions available on request.

professional staff and university students who were naïve with regard to *Es'* theoretical orientation as well as to the particular objectives of the experiment. All *Ss* were volunteers. Sixty *Ss* who were *not* able to identify correctly part or all of the stimulus during the brief exposure are referred to as the "incidental" group. Thirty of these *Ss* were shown Rebus T and 30 were shown Rebus B. Both subgroups were made up of approximately equal numbers of men and women and professional and non-professional *Ss*. No difference in susceptibility to the experimental effects was found for sex or professional status. Ten *Ss* (seven following Rebus B, three following Rebus T) correctly identified part or all of the stimuli; these *Ss* were run through the experiment but were considered as a separate sample, the "focal" group. The main findings concern the "incidental" group. Several comparisons between the "incidental" and "focal" groups will also be reported.

HYPOTHESES

Hypothesis 1: The "Clang" Effect. *Ss* should rank the three words associated with Rebus T high in "attractiveness" following the brief exposure of Rebus T, and the three words associated with Rebus B high in "attractiveness" following the brief exposure of Rebus B. In *Ss'* descriptions of their images we were prepared to look for the spontaneous emergence of words which contained only a single sound associated with the picture (*e.g.*, *be*have, dra*gon*, *t*ime, a*ny*).

TABLE 1

Relationship Between Word Group Ranking and Rebus Exposed

	Rebus T	Rebus B
No. of *Ss* Preferring Word Group T	23	16
No. of *Ss* Preferring Word Group B	7	14

$p < .05$ (one-tailed test).

Hypothesis 2: The Rebus Effect. *Ss* should rank the rebus word (tiny or begun) higher in "attractiveness" following the exposure of its pictorial representation than after the exposure of its unrelated counterpart. In *Ss'* descriptions of their images we were prepared to look for the spontaneous emergence of the rebus words (tiny, begun).

Hypothesis 3: Lack of Insight. *Ss* should fail to perceive the "clang" or rebus connections between the words and the pictures even after they have had a chance to view the rebuses at their leisure. The translation from primary-process language to secondary-process language and back again is not readily accomplished in the waking state.

RESULTS

Hypothesis 1: The "Clang" Effect.

A. As measured by the list. The ranks for each word group were totaled and compared. A plus score was given *S* if the sum ranks of the experimental word group were less than the sum ranks for the control word group; a negative score was given if the reverse was true. A significant dependence in the expected direction was found between words ranked high in "attractiveness" and rebus exposed ($p < .05$, Fisher's exact test) (Table 1). The "clang" effect could show itself also in the attractiveness with which *pairs* of words containing both syllables were ranked (*e.g.*, *t*itle-pen*ny* or *be*sides-wa*gon*). We counted the number of times these pairs appeared in the upper half of the rankings (one and two, two and three). For title-penny, ten out of 30 *Ss* ranked them one—two or three—four after Rebus T; three out of 30 *Ss* ranked them similarly after Rebus B (chi-square = 3.52, $p < .04$, one-tailed test). Although in the expected direction (two out of 30 for Rebus T, six out of 30 for Rebus B), the besides-wagon rankings were not significant. Of the remaining 13 possible pairs, none was systematically related to the rebuses.

B. As measured by spontaneous verbal-

TABLE 2

Relationship Between Spontaneous Verbalizations and Rebus Exposed

	Syllables							
	'be' and 'g-n'				'ti' and 'ny'			
	Means Adjusted for Number of Words		*F*	*p*	Means Adjusted for Number of Words		*F*	*p*
	Rebus B	Rebus T			Rebus B	Rebus T		
Combined Images	4.61	3.22	17.988	.001	2.09	1.88	*	n.s.
Images and Description of Stimulus	5.88	4.60	9.296	.01	2.65	2.21	1.026	n.s.

* Estimated error variance was the larger.

izations. The electrically recorded descriptions of the briefly exposed rebuses and *Ss*' images were scored for the four syllables: "ti," "ny," "be" and "gun." To increase the number of "gun" syllables that could be scored, any combination of hard "g," vowel and final "n" was accepted as showing the influence of the "gun" stimulus. No changes were made for the other syllables. A statistical clerk ignorant of our hypotheses scored the transcribed descriptions and counted the total number of words; to forestall any unwitting bias, we randomized the order in which the protocols were scored. Spot checks revealed close to 100 per cent agreement in the identification of the four syllables. The number of *different* words containing the key syllables was counted.[8] An analysis of covariance was done on those scores the distribution of which met criteria of normality. The total number of words used by *Ss* was covaried to control for the effect of sheer length of description on the frequency with which the syllables appeared. The combined scores for the "be" and "g-n" syllables occurred with significantly greater frequency in the images of *Ss* who had seen Rebus B than in the images of *Ss* who had seen Rebus T. No significant difference was found for the combined "ti" and "ny" scores (Table 2). The *description* of the brief flash could not be tested separately because the distributions contained too many zeros. A non-parametric analysis of variance was computed, using as the measure the ratio of number of syllables to number of words. No significant differences were found. However, the *combined* description and images scores showed a significant difference for the "be" and "g-n" sounds (Table 2).

Hypothesis 2: The Rebus Effect.

A. As measured by the list. The average rank for the rebus words was compared for the two rebuses. No significant differences were found.

B. As measured by the spontaneous verbalizations. The words *tiny* and *begun* occurred only rarely in *Ss*' productions, and these rare occurrences were not distributed in the expected direction.

Hypothesis 3: Lack of Insight.

A. Following the brief exposure of the rebuses, none of the 60 *Ss* saw either the "clang" or the rebus connection after they had read the list of words aloud, even though 37 of the *Ss* had given high ranks to the key words from the list. These 37 *Ss* are

[8] The *total* number of words containing the key syllables was also counted. The correlations between the two measures ranged from .86 to .91. We decided to use the number of *different* words as the more demanding of the two measures. An *S* might use forms of the verb *to be* not so much as a function of the effect as because of the exigencies of grammar.

important in establishing the effect. During the brief flash of the stimulus they could not correctly identify it; however, following the reading of the list, they ranked as high in attractiveness the words related by sound to the stimulus, but saw no "clang" or rebus connection of the words to what they had perceived in the flash.

B. A series of three probes was made after the *Ss* had had an opportunity to describe the rebuses at full exposure: 1) "Do you see any connection between the list of words you read aloud and the picture you now see on the screen? Could you go through the list of words, one by one? [*E* prompts *S* on words not remembered.] Do any you mentioned have any connection with the picture?" 2) "All right. Now going back to the word *begun* (*tiny*). [Both rebus words were inquired into for each *S*: the experimental word was always first.] Do you see any connection at all between that word and the picture?" 3) "Do you see any relationship between the sound of the word and the picture?" When we compared the list-positive *Ss* with those *Ss* who were unresponsive to the word list, no significant differences were found in the speed with which insight was achieved for the three questions. Clearly, having been responsive to the effect was no help in achieving insight into the relationships. We are not dealing with a practice effect, or with the reinforcement of partial cues, as suggested by Bricker and Chapanis with regard to subception (3), for if these were operative the positive cases should have shown readier insight than did the negative cases. Rather, we are dealing with two different modes of thought. Consistent with these findings for the word-list, no *S* had any idea that he was using more of one sound than of others in his descriptions. In fact, neither were the *Es* until the analysis had been done.

TABLE 3

Relationship Between Responsiveness to Rebus (List-Effect) and Initial Correct Perception of the Rebus

	Responsive to Word-List	Unresponsive to Word-List
Correct Perception (Focal Group)	2	8
Incorrect Perception (Incidental Group)	37	23

$p = .03$ (Fisher's exact test).

In their descriptions of the pictures during the prolonged exposure, *Ss* often described the knee as a leg (17 out of 29 *Ss*), and the gun as either a pistol or a revolver (11 out of 29 *Ss*). The tie (all *Ss*) and the bee (22 out of 29 *Ss*) were apparently easier for the *Ss* to identify unambiguously. No differences on the major effects could be shown between *Ss* who labeled the right half of Rebus T as a knee and those who called it a leg; nor were there any differences between the *Ss* who labeled the right half of Rebus B as a gun and those who referred to it either as a pistol or as a revolver. This lack of difference should not be surprising, because the alternate labels used are associates of the key words, an impression supported by word association data collected from 406 *Ss*.[9] The briefly flashed stimulus activated a number of associated words, including the key words. The word-list reinforced these key words, which resulted in the choice of "clangs" from the list.

Comparison of "incidental" and "focal" *Ss* was made. Of the ten "focal" *Ss*, only two responded positively to the word-list. The "focal" *Ss*' word group choices were significantly *worse* than chance (eight out of ten; $p < .05$, binomial expansion test). When we compared these ten to the 60 who were unable to identify any part of this stimulus correctly, we discovered that a significantly smaller proportion of these "focal" *Ss* were responsive to the list (Table 3; $p = .03$). We did not anticipate these

[9] The Minnesota revision of the Kent-Rosanoff Word-Association Test, with the addition of 16 words related to these experiments, was administered to 406 college undergraduates. Of the three alternate descriptions (*leg, pistol, revolver*), only *revolver* (used by six *Ss*) did not appear as an associate. We are indebted to Mr. Louis Glass for the collection and analysis of these data.

findings. The correct identification of the stimulus may either remove it from the possible transformations necessary to achieve the list-effect, or induce an inhibitory response which favors the selection of the control words.

DISCUSSION

As Fisher has shown for visual and Pine for auditory stimuli, incidental stimuli undergo transformations akin to the primary-process mechanisms Freud identified in dream formation. Our results suggest that such transformations may also affect the *names* of incidental stimuli. These names were treated by our *Ss* as if they were concrete, auditory patterns. The experimental stimuli worked in two ways: 1) *Ss* reacted to Rebus T by being attracted to the Rebus T words in the list; 2) *Ss* reacted to Rebus B by using words containing the "be" and "g-n" sounds in their descriptions of their images. As predicted, it was difficult for *Ss* to see any relation between the word-list and the pictures. We had not expected to find that the "focal" *Ss* would tend to be less responsive to the list-effect than were the "incidental" *Ss*. Not all of the effects worked as expected: 1) Rebus B did not work with the word-list; 2) Rebus T did not work with the spontaneous verbalizations; 3) the rebus effect as such did not appear.

That some *Ss* were able to identify part or all of the flashed stimulus correctly suggests that the stimuli were near the recognition threshold. We cannot say to what extent a failure to report the stimulus accurately was due to an absence of awareness, or to the incidental character of the awareness. Nevertheless, a special relationship existed between a *failure* to report something accurately and the clanglike transformations we have identified in this experiment. The failure to report some aspects of a stimulus, whether or not "awareness" can be conclusively ruled out, apparently results in a different fate in memory for the unreported percepts.

As long as there was some reportable awareness of the picture, the possibility cannot be rejected that the correct selections from the word-list might have been prompted purely by associations contingent upon the fragment of the picture *S* reported. No uniform relationship could be detected between *S*'s description of the stimulus and his word-rankings. Under this partial-information hypothesis, the poor performance on the list of the "focal" *Ss* would be particularly inexplicable.

For future work a number of inconsistencies need to be explored: 1) Why did the rebus effect not work? 2) Why were the "focal" *Ss* *less* responsive to the list than were the incidental *Ss*? 3) Why did Rebus T show more of a list-effect than Rebus B, and Rebus B more of a spontaneous verbalization effect than Rebus T?

1) The rebus effect did not appear because the two pictures making up each rebus may not have registered with equal impact. Despite our efforts to select rebuses which were as much alike as possible, the experiment taught us that they were different in some important respects. *Ss* encountered difficulty in identifying the bee after the full exposure of the stimulus (although four "focal" *Ss* were able to perceive the bee during the brief exposure). The threshold for the bee may have been more variable than the threshold for gun, tie and knee. The rebus effect may be dependent upon the simultaneous registration of both parts of the stimulus. It is also conceivable that the rebus effect did not appear because *Ss* were not in a sufficiently dreamlike state to permit this extreme degree of primary-process activity to occur. If *Ss* had dreamed, or had been placed under hypnosis, the rebus words themselves might have appeared.

2) Correct naming may be an index of a cognitive process that serves to "fix" the percept in consciousness so that it not only is immune to the effects of primary-process mechanisms but may also inhibit them. Carmichael *et al.* (4) showed that names alter the way in which ambiguous stimuli are reproduced. In a repetition of the Car-

michael study, Hermann *et al.* (11) reported an even greater influence of names upon reproduction than that found in the earlier study. They observed that, at short exposures, *S*s drew more language-influenced reproductions than at long exposures, suggesting that naming is highly influential in tachistoscopic experiments. Moreover, *S*s in the later study were not limited to the words provided by *E*s. The drawings of *S*s not given any associated words showed as much assimilation to names as did those of *S*s given words in advance. The investigators inferred that *S*s provided their own labels, which often enough coincided with those of *E*s. Our *S*s were also trying hard to identify the objects they saw; the labels they decided upon probably exercised an influence on the way they organized and maintained their impressions.

But why does not any label, correct or incorrect, serve the same purpose—that of rescuing fragmentary perceptions from primary-process influences? Allers and Teler (2) suggested that "word proximity" (the ease with which percepts can be verbalized) determines what achieves immediate recognition and what emerges in images. Word proximity is similar to the modern notion of response bias. Neither concept, however, explains why the percepts which are more "distant" from words emerge in images, or why, as in our own study, they seem to be more subject to primary-process transformations.

3) The seesaw relationship which exists for the two rebuses with regard to the list and spontaneous verbalization effects may be explained by yet undetermined artifacts in the two measures. The *tiny* words (tiny, title, penny) were on the whole more attractive to *S*s than were the *begun* words (begun, besides, wagon), which may have obscured a positive *begun* list effect (Table 1). In future work it will be important to determine the "pull" of both sets of words making up the list under the influence of a neutral stimulus. It would also be valuable to establish norms for the occurrence of the key syllables in spontaneous verbalizations. The syllable "be," for example, may have helped to show a positive "be" and "g-t" effect because it is a relatively frequent syllable in English. "Ti" and "ny" sounds, on the other hand, may be too infrequent to reflect readily the influence of an experimental stimulus. As a pure speculation, we may wonder if this seesaw relationship, when taken together with the difference in effectiveness found for the "focal" and "incidental" *S*s, may not suggest a hierarchy of responses: 1) If the stimulus is correctly identified, then the list and perhaps the spontaneous verbalizations do not work. 2) If the list works, then the spontaneous verbalizations do not work. 3) If the list does not work, spontaneous verbalizations do. Each level of response may "fix" the process so that it is not subject to further transformations. The test for this complex hypothesis must wait upon a number of technical steps, such as those referred to at the beginning of this paragraph.

For the present we may infer on the basis of our findings that, when a verbal trace is aroused by an unidentified, briefly exposed stimulus, it enters into the ensuing stream of thought as an auditory fragment which may be used phonetically to form ideas conceptually unrelated to the stimulus. When, however, the stimulus *is* identified, the verbal trace is more likely to be treated as a concept than as a phonetic building block available for the construction of other ideas. The "clang" effect we have measured in this experiment bears some formal similarity to the "clang" associative transitions found in the thinking of psychiatric patients (*e.g.*, the use of *round* in *roundabout* by the schizophrenic patient referred to earlier). The rebus technique may help us to study the conditions under which the change from a conceptual to a sensorial ordering of thought takes place—the condi-

tions, that is, under which secondary-process thinking gives way to primary-process thinking.

SUMMARY

Studies of briefly presented stimuli suggest that these stimuli undergo changes similar to the primary-process transformations Freud identified in dreams. A new method, the rebus technique, is introduced as a way of studying primary-process transformations of the names associated with the briefly exposed pictures. Thirty *Ss* who could not identify the stimulus correctly were used with each of two rebuses [tie—knee (tiny) and bee—gun (begun)] flashed at 1/50 sec. *Ss* were given a list of words containing the rebus words (tiny, begun), and "clang"-related words (*e.g.*, title, behave). After exposure of the stimulus, *Ss* ranked the words in the order in which they attracted their attention (list-effect). Waking images were also obtained from *Ss*, and the spontaneous use of the key sounds in their image descriptions were scored (spontaneous verbalization effect). "Clang" and rebus effects were predicted for the word choices from the list: rebus and "clang"-related words would be ranked high in "attractiveness" after the experimental stimulus, and low in "attractiveness" after the control stimulus. A comparable effect was predicted for the spontaneous verbalizations. It was also predicted that *Ss* would have no ready insight into the rebus and "clang" relationships when shown the stimuli above threshold. A single "clang" list-effect ($p < .05$) and a double "clang" list-effect ($p < .04$) were supported by the data. No separate rebus effect was found. The "be" plus "gun" sounds occurred with significantly greater frequency in the waking images of *Ss* who had seen Rebus B than in the images of *Ss* who had seen Rebus T ($p < .001$). *Ss* who were able to see something correctly during the brief flash of stimulus were not responsive to the list-effect. This suggested the possibility that correct identification may serve to protect perception against primary-process transformations.

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AMPHETAMINE ADDICTION

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Although prepared in 1887 (11), amphetamine was not used therapeutically until 1932, when it was introduced as an inhalant. In 1935 Benzedrine was used in the treatment of narcolepsy (30); and later in epilepsy, depression, behavior disturbance in brain-damaged children, and certain neurologic disorders. The drug was soon recognized officially (9, 10). In 1946 Bett (4) was able to list 36 diseases in which Benzedrine had been tried. In World War II it was used extensively to counter fatigue. More than 72,000,000 "energy tablets" were supplied to service personnel in Great Britain, and much the same quantity to the U. S. Armed Forces (5).

There has been some controversy as to whether amphetamine is an addictive drug. In 1938 Waud (38) warned of this; Guttmann (17) considered it unlikely, but observed that it induced sensations of well-being, relaxation, confidence and elation. In 1940 Friedenberg (15) and Hahne (19) reported single cases, but they were criticized by Myerson (24), who denied that the patients had become addicted. Shorvon (36) and Bett *et al.* (5) were of the same opinion. In contrast, others (23, 26) considered that addiction was not uncommon, and, in 1952, the World Health Organization *Expert Committee on Drugs Liable to Produce Addiction* (13) warned of the abuse of amphetamine by morphine addicts.

Despite further reports, until 1958 (6, 20, 25, 28, 29) only 42 cases of addiction had been recorded. Subsequently Connell (8) collected 42 other cases of amphetamine psychosis, of whom 32 appeared to have been addicts. He also referred to the incidence of addiction among French students and the Japanese. From these reports and our own observations, it may be concluded that addiction is probably more common then has been thought (despite Nyswander's view (27) that it has lessened during recent years).

Attention is also drawn to addiction to Preludin (3, 32), an oxazine derivative of ephedrine more closely related to caffeine than to amphetamine, but with apparently identical clinical effects. Most of those addicted to Preludin resorted to it only when amphetamine became unavailable. Apart from addiction, psychotic reactions caused by Preludin have been described (1, 7, 12, 16, 35, 37); these appear to be indistinguishable from those caused by amphetamine.

CLINICAL MATERIAL

Fourteen cases were studied, all admitted to hospital with a psychotic episode apparently due to amphetamine. Three patients, eventually found to be schizophrenic, were addicts nonetheless. (The nature of the psychotic reactions will be reported elsewhere.)

The patients studied do not reflect the overall incidence of addiction, since it was impossible to search the hospital records to extract the maximum number of cases. However, even with a limited search, seven additional cases were discovered. (These were rejected either because of inadequate information, or because of the complicating presence of other conditions.)

Most of the clinical details are presented in tabular form, some of the characteristic features being discussed more fully in the text. This would seem to be the first collection of such cases in Australia, and the second largest in the literature on the subject.

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TABLE 1
Details of Addiction

Case	Sex	Age	Duration of Addiction	Drug*	Max. Daily Dosage (mg.)	Other Drugs Periodically Taken to Excess
1	M	49	6 years	B, D, M	1,000	Alcohol
2	F	22	7 "	B, D, M, P	400	Alcohol, caffeine, morphine
3	M	32	5 "	B, D	175	Barbiturates
4	M	36	6 "	B, D	200	Alcohol, bromides
5	M	29	10 "	B, D	150	Alcohol
6	F	26	4 "	D, M	150	Bromides, aspirin-caffeine
7	F	38	10 "	B, D	150	—
8	F	32	3 "	D	?30	Barbiturates
9	F	36	4 weeks	B	50	—
10	F	32	6 years	D, P	350	—
11	M	30	3 months	D	30	Alcohol
12	M	35	6 years	B, D, M	250	Alcohol, bromides
13	M	31	5 "	D, M	60	Alcohol, bromides
14	M	30	1 "	B	Not known	Alcohol

* B, Benzedrine; D, dextroamphetamine; M, methylamphetamine; P, Preludin.

In certain respects the features of addiction seen in this series resemble those hitherto recorded. The ratio of male to female was 8:6. The average age was 33 years (range, 26–49 years). The main aspects of addiction are summarized in Table 1. All patients had access to the tablet form of the drug. Four found increasing difficulty in obtaining supplies of amphetamine, so two resorted to Preludin, the other two increasing their intake of proprietary bromide preparations. While concomitant addiction to alcohol and other drugs was a common finding, the patients selected for study were those who, when first seen, were considered to be addicted to amphetamine alone.

The duration of addiction was often a matter of years, 11 of the patients having been addicted for more than three years. In some instances, extraordinary amounts of the drug had been taken. The largest single oral dose (Case 1) consisted of the contents of three Benzedrine inhalers. (One inhaler contains 325 mg. amphetamine base, the equivalent of 561 mg. amphetamine sulfate.) Case 2 consumed the contents of two inhalers; Case 4, 500 mg. methylamphetamine at one time.

DIAGNOSIS

The chief difficulty in making a diagnosis of amphetamine addiction is that of securing a reliable history. Inconsistencies and deliberate falsifications were detected in five cases and suspected in others. Three patients (Cases 5, 6 and 7) gave information only with the understanding that their regular medical attendants would not be informed. Addicts are adept at concealing addiction: one patient (not included in the present series) took the drug despite all her husband's efforts, outwitting him by hiding the tablets in a bottle which apparently contained her baby's vitamin C. For a long time Case 5 continued to take amphetamine while in hospital, as did another patient (not included), who secretly took the drug during a six months' admission. Only on her fourth admission to hospital did Case 10 admit to taking large amounts. Since she had always denied this on earlier admissions, an incorrect diagnosis of schizophrenia had been made, based upon her false account. Similar denial of addiction presented problems in the diagnosis of Case 11. Dissimulation also made it impossible to arrive at a firm diagnosis in other suspected cases not included in the

present series. Such difficulties illustrate the investigator's dependence upon the patient's account in making the correct diagnosis. A solution to this problem may be provided by an examination of the urine (8), but unfortunately this test was not available to us during this study.

PSYCHOPATHOLOGY

It is surprising, in view of the length of time stimulant drugs have been in constant use, that there is still uncertainty concerning their effects and controversy as to whether addiction occurs. Marley (21) pointed out the lack of "systematised codification of response" to stimulants or central nervous system depressants. Contradictory effects of stimulants, such as elation and depression, are often present without explanation, or are considered to be merely the inevitable result of the complexity of the human personality. This matter needs further analysis.

While the basic reason for addiction must lie in the personality of the addict, consideration should be given to the effects desired from the use of the drug. These were well described by 13 patients, all of whom had experienced what has been termed "mental stimulation." The nature of this effect has been closely studied, and it has been agreed that subjective impressions of heightened intellectual activity are accompanied by objective signs of improved performance in experimental *Ss* (18). Sargant and Blackburn (34) found an average increase of eight per cent in scores on intelligence tests after administration of 20 mg. Benzedrine. Reaction time was shortened, and there were increased motor activity, increased production of associations, and facilitation of learning (17). Fatigue was reduced and postponed. Also well documented are the effect upon mood, and the feeling of well-being and increased physical strength, confidence and decisiveness.

Rado (31), in his analysis of pharmacothymia, stated: "At the height of the elation, interest in reality disappears, and with it any respect for reality." Our patients all showed this pattern of response to amphetamine. Many described it as a feeling of well-being, increased energy and mental alertness. With most, "a feeling of confidence" was important. The mood change approached elation in many cases; various statements made, clearly conveyed the sense of omnipotence obtained from use of the drug. Two patients used identical phraseology: "I felt I could do anything I cared to turn my hand to." Case 2 described it thus: "You feel as though you can master anything, that nothing is impossible to attain." She said that the drug gave her "a feeling of terrific strength—as if you could lift the world up in your hands." Case 1 boasted that he was more intelligent than anyone.

Such statements clearly indicate the possible extent of the regression to feelings of unlimited omnipotence. The effects of addiction also conform to Fenichel's formulation (14): "More important than erogenous pleasure in drug elation, however, is the extraordinary elevation in self-esteem." The occurrence of marked regression and the use of the passive-receptive form of mastery indicate the presence of a considerable basic personality defect.

The effects of amphetamine on sexuality have been discussed in detail elsewhere (2). In summary, it was found that the drug increases libidinal drive. All patients in the present series demonstrated a psychosexual immaturity in keeping with their disturbed personalities. The increase in libidinal drive resulted in a disturbance of equilibrium, with a breaking down of defenses and, in some cases, regression. In these instances, perverse trends became overt or exaggerated. Where the previous defense was in the nature of inhibition of sexuality, overt regression was either prevented by reinforcement of inhibition or denial of this by promiscuity. Thus some cases demonstrated

the apparent contradiction that stimulation of sexuality resulted in overt inhibition.

EFFECTS OF WITHDRAWAL

Withdrawal symptoms are limited almost exclusively to depression, physical symptoms being few and unimportant. Four patients (Cases 2, 3, 6 and 12) recognized that withdrawal of the drug caused short-lived periods of depression (a few hours or days). In four others (Cases 5, 9, 11 and 14), deep depression was observed during complete withdrawal following admission to hospital; five others were found to be moderately depressed following admission, apparently from the same cause. Case 8 reported that the depression caused by the drug was the reason for her spontaneous cessation of addiction. The occurrence of depression in most cases led to the use of alcohol or sedatives to offset the withdrawal effect. While it is possible that there may be a physiologic explanation for the depression, in psychodynamic terms it may be viewed as arising in contrast to the elation, so that pain or frustration becomes all the more unbearable.

In general, this particular sequence of events—elation followed by "morning-after" depression—is a feature of all drug addiction (14). Waud (38) observed that, in amphetamine addiction, depression followed the more immediate stimulation produced by large experimental doses. Connell (8) remarked on the danger of suicide. (This was observed in Cases 1, 2 and 11 of the present series.) Marley (21) stated that only one of his cases experienced elation as an effect of amphetamine, many more reporting depression. It would seem possible that he neglected to consider the fact that a patient when first seen on admission to hospital is in the withdrawal phase, in which depression is to be expected.

PERSONALITY AND BACKGROUND

The W. H. O. Expert Committee (13) categorized addictive drugs into three classes. There are drugs, such as morphine, which can produce addiction in any person, and drugs which never produce more than habituation. The intermediate class, which would seem to include amphetamine, is that in which addiction can develop in certain *Ss* whose psychologic make-up is the determining factor, but in whom pharmacologic effects play a significant role.

Although much time was spent in observing these patients, it does not seem possible to specify any common type of personality abnormality, other than in the broadest terms, indicating the presence of maladjustment.

Of ten patients who were married, three were divorced and six separated. Case 13 was the only patient still married, but he had arranged for his wife to live with her parents in another city as a solution to their sexual problem. Of the four single males, two were overtly homosexual.

The family histories and backgrounds of these patients were illuminating. In six there was a family history of addiction to alcohol or drugs. Overt mental illness had occurred in seven families. Of 13 *Ss* for whom the family history was available, four had no family history of alcoholism or mental illness. Of these four, the parents of one (Case 5) were clearly maladjusted, and the father of another (Case 9) was cruel and brutal to his children. Two of the three *Ss* who later became schizophrenic, and six of the remaining group of neurotic *Ss*, gave a history of marked parental discord. In 12 instances there was a clear history of overt or covert rejection by one or both parents. Only in Case 11 was no overt history of a disturbed childhood obtained, though this finding was more apparent than real. He was an only child, born in an isolated island community, whose mother had died when he was 11. He disliked his father, who was excessively strict and religious, and resented his step-mother. With this information, covert rejection by his father and overt rejection by his step-mother can be assumed. If this is accepted, all *Ss* can be considered to have had a disturbed childhood.

TABLE 2
Psychosocial Background

Case	Family History	Occupation	Premorbid Personality Type	Pre-existing Sexual Adjustment	Intelligence Level
1	Father alcoholic	Grocer	Psychopathic	Polymorphous pervert	Above average
2	Mother a suicide; twin brother defective epileptic; grandfather alcoholic	Mental nurse	Psychopathic	Homosexual	Above average
3	Patient illegitimate; father? schizophrenic; mother asthmatic	Proofreader	Schizoid	Homosexual; sadomasochism	Superior
4	Father alcoholic; mother epileptic	Unskilled	Passive-aggressive	Poor marital adjustment	Above average
5	Father "compulsive" personsonality	Clerk	Inadequate	Inhibited	Above average
6	Mother barbiturate addict	University student	Hysterical character	Frigid	Above average
7	Unknown (patient illegitimate)	Nurse	Hysterical character	Frigid	Average
8	Mother "eccentric"; sister a suicide	Machinist	Hysterical character	Heterosexually promiscuous	Not known
9	Father "unstable"	Barmaid	Passive-aggressive	Frigid; dyspareunia	Average
10	Father, brother alcoholic; sister treated for "nerves"	Unskilled	Borderline defective	Frigid	Borderline defective
11	Negative	Butcher	Passive-aggressive	Poorly adjusted heterosexually	Average
12	Father and several other relatives alcoholic	Unskilled	Inadequate	Poor marital adjustment	Superior
13	Father, brother, paternal cousin, "nervous breakdowns"	Medical student	Schizoid	Homosexual (repressed)	Above average
14	Negative	Truck driver	"Unstable"	Homosexual	Above average

The past history of this group further illustrates the degree of their personality disorders. Where a definite diagnostic label was placed upon the patient for the sake of the hospital records, this is reproduced in Table 2, but is without any other intended significance. Sexual adjustment was poor in all cases, being clearly perverse in four. Five had a history of earlier mental illness not due to amphetamine; two had had criminal convictions. The use of other drugs or the excessive use of alcohol had been recorded in nine instances. Of interest is the finding that a number had taken proprietary aspirin-caffeine preparations to excess to obtain the stimulant effect of the caffeine.

In summary, all patients showed evidence of poorly integrated personalities, apparently arising largely from their disturbed childhood environments. While no particular abnormality was common to all cases, such disturbances as were present resulted in the appearance of the passive-receptive form of mastery that makes drug addiction possible (2, 14). The reason for this specific outcome—apart from the observable elements of chance and the influence of social and cultural patterns—is yet to be determined.

FOLLOW-UP

Among them, these 14 patients were admitted to hospital on at least 35 separate occasions and subjected to a wide variety of treatments aimed for the most part at relieving psychotic symptoms. Although psychotherapy was later attempted in some

TABLE 3
Follow-up

Case	Condition of Addiction	Length of Follow-up	State During Follow-up	Marital Status When La Seen
1	Continued	18 months	Recurrent amphetamine psychosis; alcoholism	Separated
2	Continued	15 months	Recurrent amphetamine psychosis; prostitution	Separated
3	Probably continued	15 months	No change; unemployed	Unmarried
4	Continued	6½ years	Dementia due to alcoholism	Separated
5	Continued	6 years	Well with restricted intake	Unmarried
6	? Ceased	2 years	Recurrent neurosis; bromide addiction	Separated
7	Continued	5 months	Pre-psychotic	Separated
8	Not known	None	—	Separated
9	Ceased	3½ years	Recurrent neurotic depressive reaction	Divorced
10	Continued	2 years	Recurrent amphetamine psychosis	Divorced
11	? Continued	4 years	Recurrent psychotic states (? amphetamine)	Unmarried
12	Ceased	3 years	Schizophrenia; alcoholism	Divorced
13	Ceased	11 months	Schizophrenia	Married (living apart)
14	Not known	None	Schizophrenia	Unmarried

instances, in each this proved to be ineffective, due both to lack of co-operation and to the intractable nature of the personality disorder.

Follow-up of 12 of this group of 14 patients clearly illustrated the poor prognosis and high relapse rate (Table 3). Eight had continued with their addiction. In four it had apparently ceased, but, of the latter, two subsequently developed schizophrenia and lost access to the drug, and the account of a further patient (Case 6) was unreliable. In only one patient (Case 9) is it reasonably certain that a voluntary cessation of addiction has occurred.

The marital status of the patients when last seen may be considered as an index of the overall deterioration caused by addiction, and further complicated by the attendant personality disorder and sexual disturbance. A direct relationship was seen between periods of addiction and deterioration in occupational level. Case 1 lost his small business and, between periods of unemployment, worked as a laborer. Case 2 left nursing to become a prostitute. Case 3 ceased to work altogether, and was supported by a homosexual patron. The other patients provide similar though less outstanding examples, except for Case 5, who, being able to restrict his intake, maintained a reasonable level of efficiency despite continuing addiction.

The effects of amphetamine and cocaine addiction appear to be similar in stimulant and elatant properties, addiction to either drug causing alternating excitement and depression, and psychotic reactions due to cocaine are described as indistinguishable from those caused by amphetamine (22). Both drugs possess a similar action in that they lower the threshold of the reticular activating system (33). (Addiction to coca is reported to be a problem of enormous size. Estimates of addicts in South America alone run as high as eight million people (22). Arguments denying the existence of coca addiction are often identical to those against addiction to amphetamine.)

Although amphetamine is a restricted drug and properly obtainable only on a doctor's prescription, in New South Wales and many other places addicts obviously have other means of access. Their histories show

the toll of suffering and hardship both to themselves and to their families. Because of the difficulties in treatment and the poor prognosis attendant upon addiction, the best remedy would clearly seem to be prevention, with more effective policing and restriction of the sale of amphetamine.

SUMMARY AND CONCLUSIONS

Despite the widespread use of amphetamine for therapeutic and other purposes, review of the literature reveals some controversy as to whether addiction actually does occur, and contradictory views as to its frequency.

Detailed study of 14 cases led the authors to the conclusion that amphetamine addiction is a definite and not uncommon entity.

Although, as with addicts using other drugs, those affected all showed evidence of underlying personality instability, their addiction may be accounted for, in part, by the stimulant effects of the drug, which lead to elevation in self-esteem and regression to the level of experiencing a feeling of omnipotence. Psychosexual regression also tends to occur.

The personality of the addict is neurotic, sometimes pre-psychotic, but without any single or specific pattern of disturbance. All Ss in the present series had had a disturbed childhood, with a high incidence of alcoholism and other mental illness in their families.

The prognosis is poor, the relapse rate high and continued addiction the rule, leading, in time, to a gradual deterioration of occupational, social and home life.

Some patients in whom such a condition is presumably latent may lapse into schizophrenia.

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TRANSFORMATIVE HYPNODYNAMICS: A DIAGNOSTIC TECHNIQUE AND A UNIFYING THEORY OF PSYCHODYNAMICS

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CHILD (*under hypnosis*): A lion is chasing me! Help me!
PSYCHIATRIST (*commanding*): The lion will change into something or somebody else!
CHILD (*fearful, weeping*): Oh, he's come at me!
PSYCHIATRIST (*with finality*): Lion! Stop!
CHILD (*surprised*): The lion stopped.
PSYCHIATRIST (*firmly*): *One, two, three—change*!
CHILD (*amused*): Gee, it's my Dad!

Transformative hypnodynamics is a psychiatric system devised to study individual psychodynamics, using a hypnodiagnostic technique based on the phenomenon of transformativity.

The phenomenon of transformativity integrates psychologic as well as physiologic data to clarify human communication and behavior. The transformative approach under hypnosis can, it is submitted, render psychodynamics objectively meaningful. The hypnodiagnostic technique is used to collect data for transformative analysis.

The technique itself will first be described.

THE HYPNODIAGNOSTIC TECHNIQUE

The writer has evolved this technique mainly in working with children. It is a modification of the *theatre technique*, described by Rosen (7), in that the theatre technique is used as the procedure of initial induction of hypnosis. This diagnostic procedure is usually introduced after the formal psychiatric examination, and after gaining the child's confidence. Typically I ask the child if he would like to know more about why he is coming to see me. I have seldom had a negative answer. Since children enjoy seeing movies, I use "showing a movie" to reduce much of the child's pre-hypnotic resistance. The following example describes this procedure:

PSYCHIATRIST: John, do you know why you are here to see me today?
JOHN (*after a pause*): I don't know. Mother told me to come.
PSYCHIATRIST: Would you like to know more about why you are here today?
JOHN: Yes.
PSYCHIATRIST: Well, I am going to show you a movie, and the movie will tell you everything you want to know.
JOHN (*unbelievingly*): You mean movie, now? (*Looks around the consultation room.*)
PSYCHIATRIST (*confidently*): Yes, now. It is quite easy for you to see this movie, if you just sit back and close your eyes. I want you to imagine you are in a movie theatre. Do you understand?
JOHN: Yes. (*Closes eyes, settles back in chair.*)
PSYCHIATRIST: Now, try to see the seats in front of you. There are so many.
JOHN: Yes, many. (*Nods head.*)
PSYCHIATRIST: Try to see each seat clearly. Good, very good. Now, count the seats.
JOHN: One, two, three, four, five, six . . .
PSYCHIATRIST: Count up to a hundred. Look at each seat carefully.
JOHN: . . . eleven, 12, 13, 14 . . .
PSYCHIATRIST: You are now very eager to see this movie. Just relax in your seat. Keep on counting. Look at each seat carefully. Good, very good.
JOHN: . . . thirty-five, 36, 37 . . .
PSYCHIATRIST: Just relax. You shall see the movie very soon.
JOHN (*very relaxed*): . . . 99, 100.
PSYCHIATRIST (*firmly*): Look at the screen.
JOHN: Yes, it's white!
PSYCHIATRIST: Yes, it *is* white. I shall count three, and the movie will be on.
JOHN: Yes.
PSYCHIATRIST: One, two, three. There!
JOHN (*thrilled*): Donald Duck! My brother is playing checkers with Donald Duck! And . . .

The above approach is the basic hypnodiagnostic technique, setting the stage for

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the various transformative processes. The transformative processes, of course, may vary according to the need of each child and his peculiar problem in living. The following abbreviated case presentations illustrate some of the typical processes.

CASE REPORT

Case 1. Fred, an eight-year-old boy referred by his school for "throwing stones at another boy without provocation, threatening to kill somebody," was given the hypnodiagnostic procedure to determine the psychodynamics of his seemingly unprovoked aggressive behavior. The routine induction technique was followed and the following hypnodynamic material was obtained:

FRED (*still under hypnosis*): I see my father on the screen. (*Laughs.*) Yes, it's my Dad!
PSYCHIATRIST: Good, Fred. Look at your dad's face very carefully. How does he look?
FRED: Oh, just like he always looks. You know, like he does always. (*Smiles.*) He is saying "Hi!"
PSYCHIATRIST: Listen carefully, Fred. I am going to count to three. After I finish counting, your dad will change into something or somebody else. Do you understand?
FRED (*somewhat anxious*): Yes, yes.
PSYCHIATRIST: Good. Look at your dad's face very carefully. I am going to count three now. *One, two, three. Change!*
FRED (*suddenly frightened, clutching himself, trembling visibly, head between hands, legs flexed, curling up like a ball*): Gosh, it's a lion! It's a lion! He is eating a dog! He is eating a dog! I am the dog! Oh, please stop! (*Weeps.*)
PSYCHIATRIST (*with finality*): Lion, stop!
FRED (*relaxed*): He stopped. But the lion is still there.
PSYCHIATRIST: *One, two, three. Change!*
FRED (*smiling and relaxed*): It's my Dad again.

This procedure was ended with emphatic assurance that Fred would be relaxed and happy, and would remember only what he wanted to remember. When brought out of his trance, he said with a smile, "I saw my father in the movie." That was all he could remember.

Fred's history is revealing. His father was in a State hospital because he was a transvestite with an uncontrollable temper. He had beaten the boy mercilessly for years, and just prior to his forced hospitalization had attempted to choke him to death.

Case 2. Pam, an eight-year-old second grader, was referred by her pediatrician with the chief complaint: "Fear of parents leaving. Refusing to go to school. Daily complaints of headaches, stomach-aches and vomiting at times." At the time of the following procedure, Pam had stayed at home for three months.

PAM (*still under hypnosis*): It's on a stage.
PSYCHIATRIST: What else do you see?
PAM: I am dancing. I am a ballerina.
PSYCHIATRIST: What else?
PAM (*face showing annoyance*): There's a witch!
PSYCHIATRIST: Do you know her?
PAM: No, she is a witch.
PSYCHIATRIST: Look at her carefully.
PAM: Yes . . . (*but agitated*) . . . she is chasing me.
PSYCHIATRIST: Witch, stop!
PAM: She stopped.
PSYCHIATRIST: I shall count to three and she will change into something or somebody else. Do you understand?
PAM: Yes.
PSYCHIATRIST: *One, two, three. Change!*
PAM: It's Witch Lydia! She makes me mad. (*Looks angrier, points to door leading to Reception Room.*)
PSYCHIATRIST: Yes?
PAM: Can't do this, can't do that, can't do anything. (*Voice mimics that of an adult female.*)

Lydia, Pam's mother, was a night nurse, who had worked since Pam's infancy to support Pam's father while he studied for his Ph.D. He studied for ten years for the degree, and had much difficulty in getting his doctoral thesis accepted. Pam was an unplanned and only child. Her mother was always angry with her, especially when she disturbed the mother's daytime sleep. Mother paid significant attention to Pam only when she had physical complaints. In fact, the mother-child relationship resembled that of a nurse and patient. About four months before this consultation Pam had had a bout of "flu" from which she could not recover, even though her mother gave up nursing

and spent a great deal of time with her. The pediatrician entertained a number of possible diagnoses, ranging from rheumatic heart disease to leukemia. All tests were negative. Physical complaints continued and multiplied. Pam steadfastly refused to go to school. Her mother felt powerless to force her; her father was dismayed. At the time of this consultation, the mother had been at home (and resigned from nursing) for three months.

Case 3. Willy, a 16-year-old high school boy, had been referred by the Court for "turning in a false bomb alarm at his high school."

WILLY (*under hypnosis*): Gee, I feel terrified. I don't know why. I am just afraid. I am afraid . . . (*Trembles visibly.*)

PSYCHIATRIST: Now, Willy. Yes, you are afraid. Whatever you are afraid of will come on the screen.

WILLY (*trembling*): I don't see anything on the screen. I am just scared.

PSYCHIATRIST: I shall count to three. After I finish counting, something will appear. Whatever you are afraid of will come on the screen. One, two, three. *There*!

WILLY (*shaking*): Yes . . . Oh, it's a werewolf. A werewolf! A werewolf! He is shooting the werewolf. He shot it. He shot the werewolf.

PSYCHIATRIST: Look at the werewolf.

WILLY: Yes, he is dead!

PSYCHIATRIST: I am going to count to three. After I finish counting, the werewolf will change into something or somebody else. Do you understand?

WILLY: Yes.

PSYCHIATRIST: *One, two, three. Change!*

WILLY (*aghast, crying, tears streaming down his cheeks*): It looks like me. It is my twin brother. I don't have a twin brother. It's me, then. I am a werewolf in school. I am alive again. I see this girl, Carol, coming. Oh, I hold myself back. I want to attack her. I have to hold myself back. If I attack this girl, oh, she will be gone forever. Oh, please lock me up. Lock me up! Now, I am in a locked room, no windows, all locked up. I feel safe now.

Psychiatric interview revealed that Willy was preoccupied with sex. He felt very guilty about his rare masturbation, which was beyond his control. He disclosed that "after I done it, I feel like two cents." He also related this to religion, and used to pray obsessively for teen-agers not to get into "trouble" before getting married. He was known as a nervous, diffident boy, and an outcast. His parents were rigidly prohibitive of all his activities.

Case 4. Mitch, a ten-year-old boy, was referred by the Court for "choking other children and bringing knives to school."

MITCH (*under hypnosis*): Yes, I am in the movies. It's nice.

PSYCHIATRIST: I shall count to three. After I finish counting, you will see yourself with a happy feeling on the screen. Do you understand?

MITCH (*looking happy already*): Yes, yes.

PSYCHIATRIST: One, two, three. *There*!

MITCH: I am at a birthday party. I got a BB gun. Gee! (*Smiles.*) I am in the forest. There are a lot of birds.

PSYCHIATRIST: You may shoot the birds.

MITCH (*joyful, transfixed*): Bang, bang, bang, bang, bang, bang! I got six birds.

PSYCHIATRIST: Look at the birds carefully, Mitch.

MITCH: Yes.

PSYCHIATRIST: I am going to count to three. After I finish counting, every bird will change into something or somebody else. *One, two, three. Change!*

MITCH (*dumfounded*): It's my Dad, and my Mother. My brothers and sisters. They are all dead. But my Dad and Mother have come back to life.

Mitch's family was poor. He had always lived in a trailer, and had been grossly neglected. His natural mother had abandoned him in a restaurant as an infant. The brothers and sisters referred to under hypnosis were actually his half-siblings; he had not been told he had a step-mother.

Case 5. Tom, an eight-year-old boy, was referred by his mother's psychiatrist with the chief complaint: "Hyperactive and failing in school with a good I.Q."

During the interview Tom offered a dream: "I have dreamed this dream many times, but I don't know why. The dream is always the same:

"In our church. I am in the church. I try to get money out of my pocket and my el-

bow hits someone. I turn around. There would be Julie and Charlotte, my cousins. They would make signs for me to come over to their side of the bench and I could not get over."

TOM (*under hypnosis*): Yes, I am in church again. Yes, I am having the same dream over again. There they are, Julie and Charlotte. They are asking me to come over to their side of the bench . . .

PSYCHIATRIST: Listen carefully, Tom.

TOM: Yes.

PSYCHIATRIST: I am going to count to three. After I finish counting, Julie and Charlotte will change into something or somebody else. Do you understand?

TOM: Yes.

PSYCHIATRIST: *One, two, three. Change!*

TOM (*suddenly talking babyishly*): I look three. It's in our living-room. It's my Daddy. He is there. And Auntie Dee. There's Mother. I don't know what they are doing. They are at a table. They are signing papers. (*Agitated.*) They are trying to adopt Julie and Charlotte out! They are taking them away. Uncle Ray and Auntie Dee are taking them away. (*Face red with anger.*) I am mad at Dad. They are my sisters! They are taking them away. Mother is crying. She is crying on the porch. Dad looks happy. (*Looks very angry and hyperactive.*) Father is happy, my father is happy! They are taking my sisters away. Mother is crying on the porch. They are driving away . . .

Tom was raised by a disturbed mother with a long psychiatric history. She had divorced Tom's father when Tom was three years of age. Just before the divorce, marital strife forced them to give Julie and Charlotte to Aunt Dee, a maternal sister, for adoption. Tom was raised in ignorance of the facts, even though the children had exchanged occasional visits as cousins.

As these fragments suggest, this technique can yield a variety of clearly relevant clinical data. But is there a meaningful theoretical construct for all the transformative processes? This question may be answered in terms of a *theory of transformativity*.

DEFINITION OF TERMS

To clarify the basic theory of transformativity, the terms used in describing the transformative phenomenon must be defined accurately.

Terms are divided into two classes. The first comprises the *primary terms*. By this is meant those terms used for the general statement of the theory. The second class comprises *secondary terms*, derived from the primary. Secondary terms are used as manipulative elements to construct the various transformative sets in hypnodynamics, a special instance of general psychodynamics.

PRIMARY TERMS

1) The Perceiver (P). *P refers to any person who can receive and transmit messages.*

2) The Concrete Object (Co). *Co is defined as the stuff the universe is made of.* Its existence is known by P because it manifests itself to P in terms of mass, energy, motion, organization and interaction of one Co upon another. In short, the Co is the core of all natural phenomena, physical and psychic.

3) The Concrete Referent (Kr). *Kr is that aspect of Co seen as a related whole by P through his selective attention and focusing.* The levels of selective attention and focusing range from the sub-atomic to the cosmologic. The Co can be attended to and focused upon, in theory at least, from an infinite number of levels, depending upon the interest of P and the capability of his sensory organs and instruments. Operationally, a Kr is the usual stimulus, emanated by the Co, varying from the maximally redundant to the minimally invariant, together with its interaction on other Cos. It is this synthetic configuration by which P habitually identifies the Co as the Kr. Diagrammatically, the Kr may be represented in relation to the Co as:

$$\left.\begin{array}{l} Co^1{}_x \rightarrow \left\{\begin{array}{l} \text{Mass} \\ \text{Energy} \\ \text{Motion} \\ \text{Organization} \end{array}\right. \\ \downarrow \\ Co^2{}_x \rightarrow \text{Interaction} \end{array}\right\} Kr^1{}_x$$

4) The Physiologic Set (Ps). *Ps is the bodily variable states, including all physical,*

biochemical, neural and experiential integration in any given time interval, during which P attends to and focuses upon a given Kr.

5) The Perceptual Image (Pm). *Pm refers to the equivalent neural representation by which a Kr is recorded.* The Pm is only a probable inference of a given Co. In fact, P can never know "everything" about a given Co, because the corresponding Pm fluctuates, modifies and increases in complexity through further experiencing. Moreover, P can never be sure whether any given Co is referred by the same Pm unless he attends to and focuses upon the exact Kr in its every element when first perceived.

6) The Linguistic Expression (Lx). *Lx is defined as the written, spoken or pantomimed sign or the antemotor neural equivalent for a given Pm.* The linguistic expression is the usual word, or behavior, used in P's linguistic community to identify the Kr by which the Co is culturally inferred to exist.

7) The Symbolic Substitute (Sm). *Sm is the Lx used to symbolize some elements of a given Kr.* It is a simile or metaphor for the Kr. The Sm does not represent sufficient elements to enable P to so decode the Lx, out of context, as to identify the Kr by which the Co is culturally inferred to exist.

SECONDARY TERMS

With the primary terms defined, the secondary terms will be derived from the above definitions. They are presented systematically in Table 1. This table will be used to make transformative analysis of the clinical data already described.

Careful study of Table 1 shows that an inter-relationship exists throughout the various levels of the transformative cycle. This cycle may best be visualized with the aid of a simple example. Let us see how a perceiver (P) learns the word (Lx) for the original concrete object (Co). Suppose a three-year-old boy, Johnny, is taken by his mother to see the lion-in-the-zoo for the first time. Johnny is our P. The lion-in-the-zoo is our external Co, the exocore-lion (Co^{lion}_{x}). The exocore-lion (Co^{lion}_{x}) emits many stimuli: its scent, color, hairiness, bodily temperature, roaring sound, stalking motion and others. This exocore-lion (Co^{lion}_{x}) also produces an interaction upon another exocore (namely, Co^{mother}_{x}), who emits consistently a phoneme, the exolex-lion (Lx^{lion}_{x}). The exokere-lion (Kr^{lion}_{x}) is the combination of the direct stimuli from lion-in-the-zoo and the indirect word "lion," from mother. The exokere (Kr^{lion}_{x}) stimulates directly the various sensory receptors to provide the raw data for the exophyset (Ps^{lion}_{x}), in terms of olfactory, optic, tactile, thermal and auditory excitations, *together* with the phoneme from mother, to form the crude neural equivalent, exopima-lion (Pm^{lion}_{x}). This image is then encoded as a permanent organizational change in Johnny's brain. The nervous tissue involved is the endocore-lion (Co^{lion}_{n}). The endocore-lion (Co^{lion}_{n}) is no more totally perceivable than the exocore-lion (Co^{lion}_{x}) is totally knowable. However, the endocore-lion (Co^{lion}_{n}) is able to emit correspondingly the whole range of sensory elements in the brain—olfactory, optic, auditory and every other sensory modality—like the exokere-lion (Kr^{lion}_{x}), including the extra element, the exolex-lion (Lx^{lion}_{x}), the spoken word "lion," uttered by mother to identify the real lion-in-the-zoo for Johnny. When adequately stimulated, the endokere-lion (Kr^{lion}_{n}) is fully capable of producing physiologic changes in the various organ systems of P, namely, Johnny. The pattern of activated bodily changes in the various organ systems is presented in the brain to form a set. This set is the endophyset-lion (Ps^{lion}_{n}), which, in turn, forms the final perceptual image for action or inaction. This perceptual image is the endopima-lion (Pm^{lion}_{n}), which is then indexed by a minimal invariant neural sign, the unspoken word of the unmoved action. This neural sign is termed the endolex-lion (Lx^{lion}_{n}), and the spoken word is the exolex-lion (Lx^{lion}_{x}), as Johnny mimics mother. This wordy description may be grasped by a simple diagram (Figure 1).

Now, substituting 1 for lion, and 2 for

TABLE 1

The Secondary Terms

PRIMARY TERMS Symbol & Name		SECONDARY TERMS Symbol & Name		DEFINITION OF SECONDARY TERMS	EXAMPLE	FORMULA	LOCUS
P	Perceiver	Kr_x^P	Perceiver in question	Any person who can receive and transmit messages.	Johnny, a boy.	Kr_x^{boy}	In space and time.
Co	Core: Concrete object	Co_x	Exocore	The stuff the universe is made of, excluding the nervous system of the perceiver in question.	The lion-in-the-zoo.	Co_x^{lion}	In space and time.
		Co_n	Endocore	The stuff the perceiver's nervous system is made of.	The brain stuff involved.	Co_n^{lion}	Temporal and prefrontal lobes?
Kr	Kere: Concrete referent	Kr_x	Exokere	The probable stimuli emitted by a given Co_x and by which the perceiver experiences the Co_x as related whole.	The lion's color, motion, etc.	Kr_x^{lion}	Between the Co_x and Kr_x^P.
		Kr_n	Endokere	The neural equivalent of every element of Kr_x in perceiver's nervous system.	Molecular organization.	Kr_n^{lion}	Interplay of temporal and prefrontal lobes.
Ps	Physet: Physiologic set	Ps_x	Exophyset	The direct physiologic changes, as a set, in the perceiver's receptors stimulated by a given Kr_x.	Optic, acoustic changes, etc.	Ps_x^{lion}	Retina, cochlea, etc.
		Ps_n	Endophyset	The delayed physiologic changes, as a set, in the perceiver's brain stimulated by Kr_n.	Fear reaction to lion.	Ps_n^{lion}	Hypothalamus, cingulate gyrus and hypocampus.
Pm	Pima: Perceptual image	Pm_x	Exopima	The direct perceptual integration of all the elements of Ps_x.	Lion as seen, heard, etc.	Pm_x^{lion}	Thalamus, post-central gyri areas 17, etc.
		Pm_n	Endopima	The delayed perceptual integration of all the elements of Ps_n.	Lion as recalled.	Pm_n^{lion}	Reticular formation?
Lx	Lex: Linguistic expression	Lx_x	Exolex	The spoken, written or behaviorial equivalent of a given Kr_x.	Phoneme for lion.	Lx_x^{lion}	In space and time.
		Lx_n	Endolex	The neural equivalent of Lx_x before the final motor discharge.	Thought for the word "lion."	Lx_n^{lion}	Areas 4, 6, Broca's area, angular gyrus.
Sm	Sym: Symbolic substitute	Sm_x	Exosym	The Lx_x standing not for the original Kr_x, but only for some of the elements of the Kr_x.	Johnny: "Father is a lion."	Sm_x^{lion}	In space and time.
		Sm_n	Endosym	The neural equivalent of Sm_x before the final motor discharge.	Thought: "Father is a lion."	Sm_n^{lion}	Areas 4, 6, Broca's area, angular gyrus.

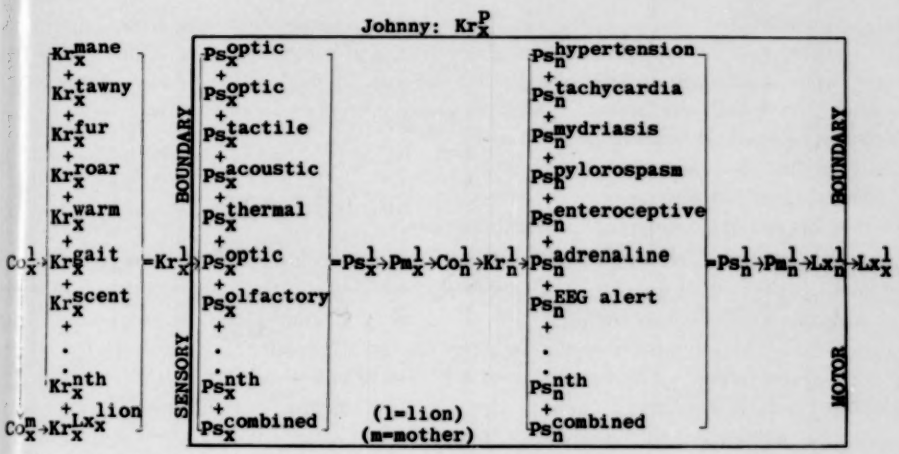

FIG. 1. The original word (Lx_x) production.

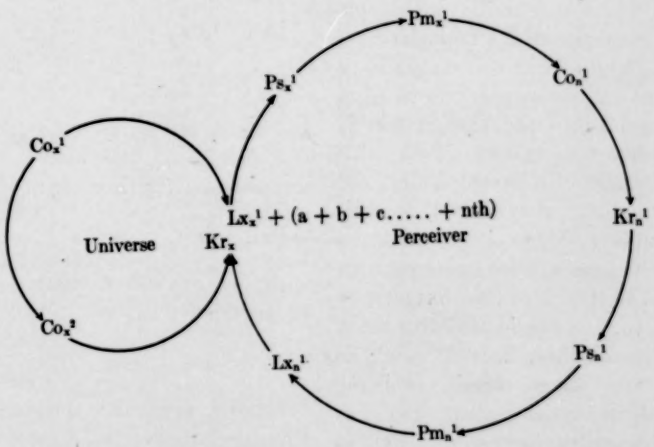

FIG. 2. The transformative cycle. (Note: Let 1 = Lion, 2 = Mother, Perceiver = Johnny.)

mother, and omitting the elements of the physets (Ps^1_x and Ps^1_n), we obtain a diagram of the universal transformative cycle, showing continuous transforming processes of P, using the exolex as the concrete referent to complete the cycle. This is illustrated in Figure 2.

Note that the concept of the symbolic substitute (Sm) has not been used in the original word production (Lx_x), since the exosym (Sm_x) belongs properly to the theory of transformativity.

THE THEORY OF TRANSFORMATIVITY

The theory of transformativity is that linguistic expressions (Lx) and symbolic substitutes (Sm) and physiologic sets (Ps) are not separately maintained, but can be transformed into each other. This relationship may be expressed by the following equation:

$$Lx \rightleftharpoons (Ps) \rightleftharpoons Sm$$

Let us analyze an example in terms of this theory, by returning to Johnny, the three-

year-old who visited the lion-in-the-zoo with his mother. Let us suppose Johnny goes home, where his father, an alcoholic tyrant, is roaringly drunk and brutal. If Johnny says that he is afraid of his father, the latter shouts at him and beats him all the more. So Johnny goes out and plays in the street. Mother has now gone shopping. A neighbor, meeting him, asks, "Johnny, why don't you go home and play? It's not safe in the street for a little boy." Johnny replies, "No, I can't go home. Mommy is not home. There's a lion in the house!" The neighbor says, "Johnny, you are joking!" Johnny says, "I am not neither." And indeed he is not. He is merely substituting symbolically for the exolex-father ($Lx^{father}{}_x$) an exosym-lion ($Sm^{lion}{}_x$), to report the similar physiologic sets of fear engendered by both $Kr^{father}{}_x$ and $Kr^{lion}{}_x$. The theory of transformativity shows that the transformative process from the exolex-father into the exosym-lion is neither arbitrary nor random. Much criticism has been rightfully leveled against the psychoanalytic practice of Freud in arbitrary and subjective symbol interpretation (3). These criticisms will be answered with this theory. The theory of transformativity hypothesizes that symbolic transformation takes place predictably, because symbolic substitutes (Sm) share certain probable elements in their physiologic sets (Ps) with those of the linguistic expressions (Lx), so transformed. Diagrammatically, in Johnny's predicament we see:

$$\begin{array}{l} Kr^{father}{}_x \rightarrow Ps^{(fear)}{}_n \rightarrow Lx^{father}{}_x \\ \qquad\qquad \downarrow\uparrow \\ Kr^{lion}{}_x \rightarrow Ps^{(fear)}{}_n \rightarrow Lx^{lion}{}_x \end{array}$$

The intermediate steps are omitted to illustrate more cogently that the two endophysets ($Ps^{father}{}_n$ and $Ps^{lion}{}_n$) contain such similar physiologic variables as to become statistically insignificant in their potential to elicit either an exolex-father or an exosym-lion. We may say that

$$Ps^{father}{}_n \rightleftharpoons Ps^{(fear)}{}_n \rightleftharpoons Ps^{lion}{}_n$$

and then, if we substitute 1 for father, 2 for lion, and e for the common physiologic set of fear, we can reduce Johnny's transformative process to a more abstract form, as

$$\begin{array}{l} Kr^1{}_x \rightarrow Ps^e{}_n \rightarrow Lx^1{}_x \\ \qquad\quad \downarrow\uparrow \\ Kr^2{}_x \rightarrow Ps^e{}_n \rightarrow Lx^2{}_x \end{array}$$

and $Kr^1{}_x$ contains $Kr^{Lx_x{}^1}{}_x$ as an element, which element itself can stimulate one single sensory channel—the auditory—to activate the total exopima-1 ($Pm^1{}_x$) in P's brain. This, of course, would in turn integrate P's bodily changes as the corresponding endophyset-1 ($Ps^1{}_n$). We may rewrite the above transformative equation like this, since $Kr^{Lx^1{}_x}{}_x$ and $Lx^1{}_x$ are really identical:

$$\begin{array}{l} Lx^1{}_x \rightarrow Ps^e{}_n \rightarrow Lx^1{}_x \\ \qquad\quad \downarrow\uparrow \\ Lx^2{}_x \rightarrow Ps^e{}_n \rightarrow Lx^2{}_x \end{array}$$

and since, furthermore, $Lx^2{}_x$ becomes $Sm^2{}_x$ (by definition), we obtain the universal transformativity equation:

$$Lx^1{}_x \rightleftharpoons Ps^e{}_n \rightleftharpoons Sm^2{}_x$$

Briefly, the transformative equation may be written:

$$Lx \rightleftharpoons (Ps) \rightleftharpoons Sm$$

Having presented the basic theory of transformativity, I offer some postulates for the use of clinical analysis.

POSTULATES OF TRANSFORMATIVITY

The theory of transformativity opens a wide horizon for postulates in analyzing psychodynamics objectively, while still retaining introspection as one of the valid sources for data collecting. These postulates are:

1) Linguistic expressions (Lx) and symbolic substitutes (Sm) are freely interchangeable, provided a transformer is secured in a common physiologic set (Ps).

2) An endophyset (Ps_n) may evoke either an exolex (Lx_x) or an exosym (Sm_x), de-

pending upon other variables that may have inhibitory or facilitative influences upon the corresponding endolex (Lx_n) or endosym (Sm_n) as to transformation into exolex (Lx_x) or exosym (Sm_x).

3) Symbolic substitutes and linguistic expressions cannot be understood in terms of each other unless the corresponding physiologic sets are known.

4) An exolex is constant in any given speech community, but an exosym is less constant and may not be universal. Symbolic substitutes are unstable, changing from person to person within the same speech community, and from culture to culture between different speech communities.

5) The universal invariant transformer of two linguistic expressions is the similarity of their physiologic sets.

6) A linguistic expression (Lx_x) can activate a corresponding endokere (Kr_n) to discharge the whole range of physiologic variables as included in the original endophyset.

7) Both symbolic substitutes (Sm) and linguistic expression (Lx) can induce each other *via* common endophysets (Ps_n).

8) Linguistic expressions (Lx) and symbolic substitutes (Sm) can activate each other's endokere (Kr_n).

9) All transformative processes *within* P are reversible, from the exophyset to the endolex, although the probability of the reversibility action may range from almost zero to almost unity.

10) The exolex (Lx_x) and exosym (Sm_x) are subject to modifications or disturbances at any level of the transformative cycle.

11) Any element of an exokere (say, Kr^1_x), from Kr^a_x to a Kr^n_x, has the varying probable potential to act as the entire Kr^1_x on P.

The above postulates suggest that, if we had a way of inducing the common physiologic set of a given Lx or its Sm, we would hold the key not only to the understanding of symbolism itself, but also to all transformative processes and the psychosomatic implications in health as well as in disease, physical as well as psychic.

Let us now apply the theory and the postulates to analyze the psychiatric disturbances in the five children described.

TRANSFORMATIVE ANALYSIS

Transformative analysis is the method of solving a relatively unknown quantity as a function of a generally well known formula. To use our previous example: Johnny's father, Kr^{father}_x, is an unknown term to us, as symbolized Lx^{father}_x, but our reaction to a lion, Kr^{lion}_x, is generally known to us. Johnny's psychodynamics (of not wanting to go home alone to his father, or of running the risk of playing in the street) becomes apparent by this process, although in the present state of our knowledge of psychophysiology this transformative equation is not mathematically exact. It cannot yet be written as $y = f(x)$, but rather as

$$Lx^1_x \rightarrow f(Sm^2_x)$$

wherein Lx^1_x is the relatively unknown term. This unknown term will be called the *transformate*, and the better known endproduct, Sm^2_x, after the arrow, as the *transformad*. The transformate may be any unknown term, such as exolex, exosym, endophyset, endocore or any other term of the transformative cycle. Although hypnosis is used as the transformative agent in this research project, Pavlov's (5) conditioning may be another agent, and electricity yet another. The use of electrical stimulation on the living brain of P, Kr^{brain}_x, can activate an endophyset, Ps_n, or an endopima, Pm_n, as evidenced by verbal report from the patient whose brain is being stimulated. This transformative process, induced by electrical stimulation, has been demonstrated by Penfield (6):

$$\underset{\text{(transformate)}}{Kr^{\text{temporal lobe}}_x} \xrightarrow[\text{electricity}]{} \underset{\text{(transformad)}}{L_x{}^{songs}{}_x}$$

The psychodynamics of the five children

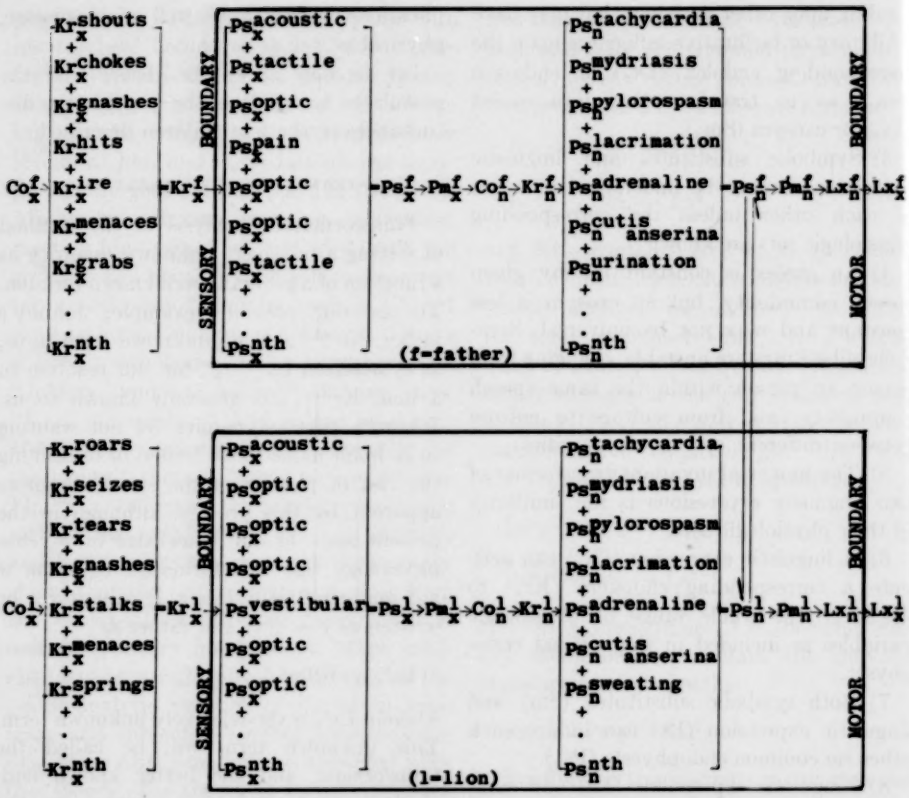

FIG. 3. The exolex transformation (Case 1, endophyset: fear).

reported above are analyzed to illustrate five basic transformative processes in detail.

Case 1 is an example of *exolex transformation*. The transformate is an exolex (Lx_x) and the transformad is an exosym (Sm_x). To investigate the meaning of any given linguistic expression (Lx_x) is to transform it into its symbolic substitute (Sm_x), which may then yield meaning for the particular individual involved. Take exolex-father ($Lx^{father}{}_x$), which obviously has varying meanings and feelings for every child using it. Fred used $Lx^{father}{}_x$ which, under hypnosis, was transformed into $Sm^{lion}{}_x$. Here we have learned something about the psychologic world of Fred. Fred has habitually summarized his physiologic set as $Ps^{(fear)}{}_n$. It is therefore contended that not by random chance was Fred's $Pm^{father}{}_n$ transformed into a $Pm^{lion}{}_n$. This is a process statistically predictable in terms of experience and logical analysis. The process may be diagramed as in Figure 3.

In summary,

$$Kr^{father}{}_x \rightarrow Ps^{(fear)}{}_n \rightarrow Lx^{father}{}_x$$
$$\downarrow\uparrow$$
$$Kr^{lion}{}_n \rightarrow Ps^{(fear)}{}_n \rightarrow Lx^{lion}{}_x$$

Simply,

$$Kr^{father}{}_x \rightarrow Ps^{(fear)}{}_n \rightarrow Lx^{lion}{}_x$$

and,

$Kr^{father}{}_x = Lx^{father}{}_x$ (by Postulate 11),
and $Lx^{lion}{}_x = Sm^{lion}{}_x$ (by definition)

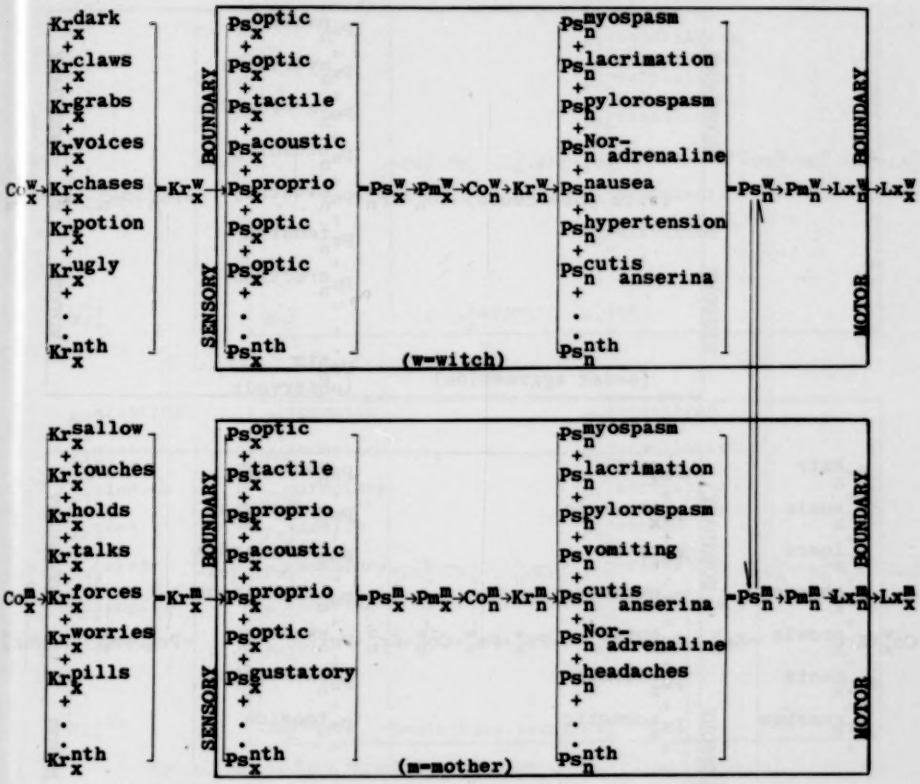
Co$^{w}_{x}$ → Kr$^{w}_{x}$ → Ps$^{w}_{x}$ → Pm$^{w}_{x}$ → Co$^{w}_{n}$ → Kr$^{w}_{n}$ → Ps$^{w}_{n}$ → Pm$^{w}_{n}$ → Lx$^{w}_{n}$ → Lx$^{w}_{x}$
Kr$^{dark}_{x}$ + Kr$^{claws}_{x}$ + Kr$^{grabs}_{x}$ + Kr$^{voices}_{x}$ + Kr$^{chases}_{x}$ + Kr$^{potion}_{x}$ + Kr$^{ugly}_{x}$ + . . . Kr$^{nth}_{x}$
BOUNDARY
SENSORY
Ps$^{optic}_{x}$ + Ps$^{optic}_{x}$ + Ps$^{tactile}_{x}$ + Ps$^{acoustic}_{x}$ + Ps$^{proprio}_{x}$ + Ps$^{optic}_{x}$ + Ps$^{optic}_{x}$ + . . . Ps$^{nth}_{x}$
(w-witch)
Ps$^{myospasm}_{n}$ + Ps$^{lacrimation}_{n}$ + Ps$^{pylorospasm}_{n}$ + Ps$^{Nor-adrenaline}_{n}$ + Ps$^{nausea}_{n}$ + Ps$^{hypertension}_{n}$ + Ps$^{cutis\ anserina}_{n}$ + . . . Ps$^{nth}_{n}$
MOTOR
BOUNDARY
Co$^{m}_{x}$ → Kr$^{m}_{x}$ → Ps$^{m}_{x}$ → Pm$^{m}_{x}$ → Co$^{m}_{n}$ → Kr$^{m}_{n}$ → Ps$^{m}_{n}$ → Pm$^{m}_{n}$ → Lx$^{m}_{n}$ → Lx$^{m}_{x}$
Kr$^{sallow}_{x}$ + Kr$^{touches}_{x}$ + Kr$^{holds}_{x}$ + Kr$^{talks}_{x}$ + Kr$^{forces}_{x}$ + Kr$^{worries}_{x}$ + Kr$^{pills}_{x}$ + . . . Kr$^{nth}_{x}$
BOUNDARY
SENSORY
Ps$^{optic}_{x}$ + Ps$^{tactile}_{x}$ + Ps$^{proprio}_{x}$ + Ps$^{acoustic}_{x}$ + Ps$^{proprio}_{x}$ + Ps$^{optic}_{x}$ + Ps$^{gustatory}_{x}$ + . . . Ps$^{nth}_{x}$
(m-mother)
Ps$^{myospasm}_{n}$ + Ps$^{lacrimation}_{n}$ + Ps$^{pylorospasm}_{n}$ + Ps$^{vomiting}_{n}$ + Ps$^{cutis\ anserina}_{n}$ + Ps$^{Nor-adrenaline}_{n}$ + Ps$^{headaches}_{n}$ + . . . Ps$^{nth}_{n}$
MOTOR
BOUNDARY

FIG. 4. The exosym transformation (Case 2, endophyset: hostile compliance).

Therefore,

$$Lx^{father}{}_{x} \rightarrow Ps^{(fear)}{}_{n} \rightarrow Sm^{lion}{}_{x}$$

Case 2 is an example of *exosym transformation*. The transformate is an exosym (Sm_x) and the transformad is exolex (Lx_x). This is the reversible process of exolex transformation. Under hypnosis, Pam, an eight-year-old girl, presented a ballet scene with a witch chasing her. Who is this witch? The transformative process disclosed the witch to be (expectedly) $Lx^{mother}{}_{x}$. This transformative process may be diagramed as in Figure 4.

In summary,

$$Kr^{witch}{}_{x} \rightarrow Ps^{(hostile\ compliance)}{}_{n} \rightarrow Lx^{witch}{}_{x}$$
$$\downarrow\uparrow$$
$$Kr^{mother}{}_{x} \rightarrow Ps^{(hostile\ compliance)}{}_{n} \rightarrow Lx^{mother}{}_{x}$$

Simply,

$$Kr^{witch}{}_{x} \rightarrow Ps^{(hostile\ compliance)}{}_{n} \rightarrow Lx^{mother}{}_{x}$$

and

$$Kr^{witch}{}_{x} = Lx^{witch}{}_{x} \text{ (by Postulate 11)} = Sm^{witch}{}_{x} \text{ (by definition)}$$

Therefore,

$$Sm^{witch}{}_{x} \rightarrow Ps^{(hostile\ compliance)}{}_{n} \rightarrow Lx^{mother}{}_{x}$$

Case 3 is an example of *endophyset transformation*. The transformate is an endophyset (Ps_n) and the transformad is an exolex (Lx_x). To explore further psychodynamics, we may apply exolex or exosym transformation. Under hypnosis, Willy was observed to have a spontaneous physiologic set. The observed endophyset was transformed into exosym-werewolf and then into exolex-self,

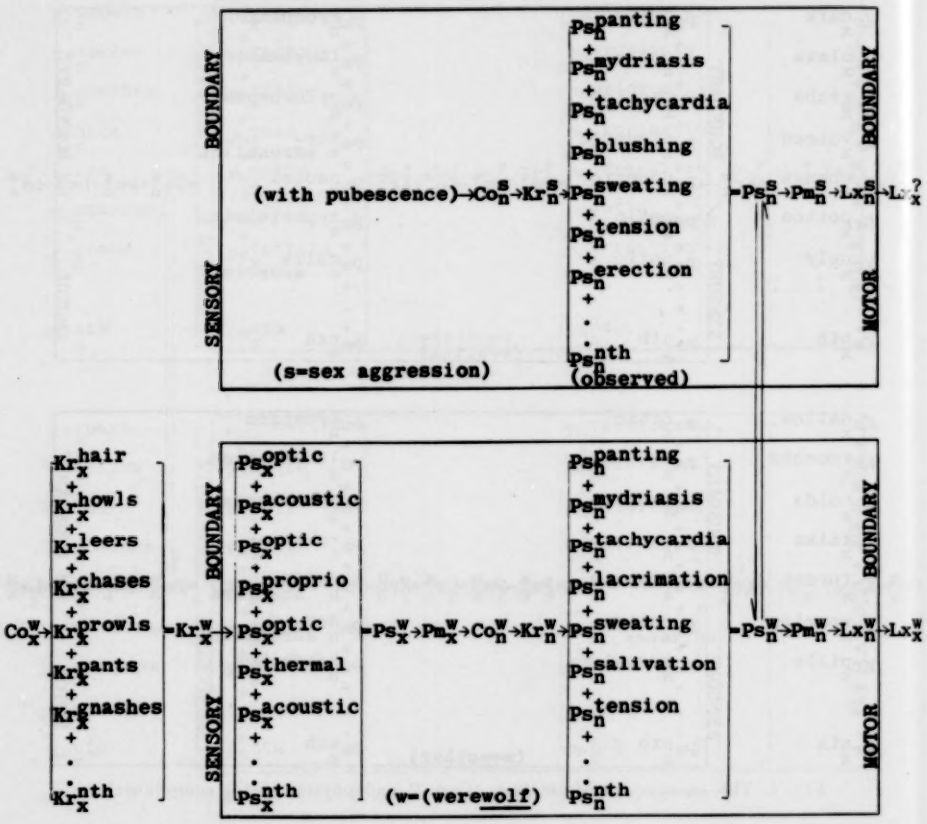

FIG. 5. The endophyset transformation (Case 3, endophyset: sex aggression).

his sexual-aggressive impulse. Why did Willy turn in a false bomb alarm? Because of this sexual-aggressive impulse that threatened him from within. He was signaling for help to avert his personality crisis. This may be diagramed as in Figure 5.

In summary,

$$\begin{array}{l} \mathrm{Kr}^{\mathrm{Willy}}{}_{x} \rightarrow \mathrm{Ps}^{(\text{sex-aggression})}{}_{n} \rightarrow \mathrm{Lx}^{?}{}_{x} \\ \qquad\quad \downarrow\uparrow \\ \mathrm{Kr}^{\mathrm{werewolf}}{}_{x} \rightarrow \mathrm{Ps}^{(\text{sex-aggression})}{}_{n} \rightarrow \mathrm{Lx}^{\mathrm{werewolf}}{}_{x} \end{array}$$

Simply,

$$\mathrm{Ps}^{(\text{sex-aggression})}{}_{n} \rightarrow \mathrm{Pm}^{\mathrm{werewolf}}{}_{n} \rightarrow \mathrm{Lx}^{\mathrm{werewolf}}{}_{x}$$

and

$$\mathrm{Lx}^{\mathrm{werewolf}}{}_{x} = \mathrm{Sm}^{\mathrm{werewolf}}{}_{x} \text{ (by definition)}$$

and $\mathrm{Ps}^{(\text{sex-aggression})}{}_{n} = \mathrm{Lx}^{\mathrm{Willy}}{}_{x}$ (by Postulate 11)

Therefore,

$$\mathrm{Ps}^{(\text{sex-aggression})}{}_{n} \rightarrow \mathrm{Sm}^{\mathrm{werewolf}}{}_{x} \rightarrow \mathrm{Lx}^{\mathrm{Willy}}{}_{x}$$

Case 4 is an example of *exokere transformation*. The transformate is an exokere (Kr_x) and the transformad is an exolex (Lx_x), from which other transformative processes can be made. Under hypnosis, any element of the exokere (Kr_x) can activate an endokere (Kr_n). The element of an exokere (Kr_x) was given to the ten-year-old boy, Mitchell, who then reported his endopima (Pm_n) as $\mathrm{Lx}^{\text{birthday party}}{}_{x}$. From this innocent production, homicidal hostility was

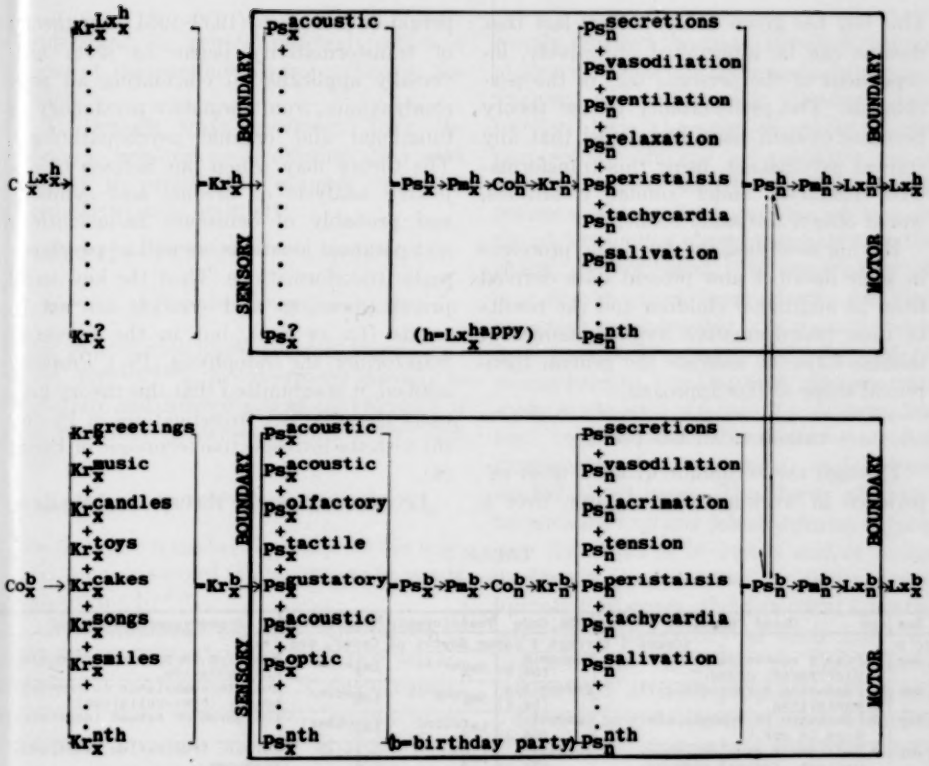

FIG. 6. The exokere transformation (Case 4, endophyset: euphoria).

revealed toward his father, step-mother and siblings, thus providing us with a clue to his aggressive behavior. The first part of the transformation may be diagramed (Figure 6) as follows (the derivative process from $Sm^{birds}{}_x$ to $Lx^{siblings}{}_x$ and $Lx^{parents}{}_x$ having already been demonstrated as the exosym transformation):

In summary,

$$Kr^{Lx}{}_x{}^{happy}{}_x \longrightarrow Ps^{(excitement)}{}_n \longrightarrow Lx^{happy}{}_x$$
$$\Downarrow\Uparrow$$
$$Kr^{birthday\ party}{}_x \longrightarrow Ps^{(excitement)}{}_n \longrightarrow Lx^{birthday\ party}{}_x$$

Let

$$Lx^{happy}{}_x = a$$

Then simply,

$$Kr^{a} \longrightarrow Ps^{(excitement)}{}_n \longrightarrow Lx^{birthday\ party}{}_x$$

Case 5 is an unexpected example of dream interpretation as a transformative process. The transformate is an exolex (Lx_x), as is the transformad. This may be a more objective method to translate private symbols of dreams into universal meanings. The arbitrary use of dream material in interpreting psychodynamics has been criticized since the publication of Freud's "Interpretation of Dreams" (4). The theory of transformativity and the transformative hypnodiagnostic technique may sway the Scottish verdict of "not proven" by Eysenck (3) to a more positive note. As we saw in Tom's recurrent dream of his cousins in the church, the $Lx^{cousins}{}_x$ turned out to be $Lx^{sisters}{}_x$. This can be expressed:

$$Lx^{cousins}{}_x \longrightarrow Ps^{(fear\ of\ abandonment)}{}_n \longrightarrow Lx^{sisters}{}_x$$

This boy has given us the clinical fact that dreams can be interpreted objectively, independent of the personal bias of the psychiatrist. The predictability of the theory becomes evident here, and I feel that any trained psychiatrist, using this transformative technique under similar conditions, would obtain the same result.

Having described the five basic processes in some detail, I now present data derived from 25 additional children and the results of their transformative hypnodynamics in tabular form, to indicate the general theoretical scope of this approach.

THEORETICAL DISCUSSION

Through the technique evolved from experience in working with children over a period of two years (1959–1961), the theory of transformativity began to seem universally applicable in elucidating all psychodynamics, from normative psychology to functional and organic psychopathology. The theory may widen our horizon of objective analysis of dreams and symbols, and probably of delusions, hallucinations and paranoid ideations, as well as psychosomatic transformations. Thus the key to all private meanings and symbols lies not in words (Lx or Sm), but in the universal transformer, the endophyset (Ps_n). Properly applied, it is submitted that this theory may unify the objective investigations of Pavlov (5) with the introspective technique of Freud (4).

Let us see how the theory can help us to

TABLE 2

Tabulation of Transformative Processes in 30 Children

Case	Sex	Age	Chief Complaint	APA Code	Transformate	Transformad	Hypnodynamics in Brief
#1 to 5			(Cases 1 through 5 under Report of Cases, see text)				
6	Boy	9	"Can't concentrate; nightmares; cries."	Neurosis (54.3)	Sm_x castle	Lx_x father	Reacting to paternal rejection and isolation.
7	Boy	16	"Enticing 4-year-old girl; exhibiting."	Pedophilia (54.4)	Sm_x cowgirl	Lx_x mother	Hostile compliance to controlling mother (over-religious).
8	Boy	8	"Backward in school; starting fire in car."	Conduct (54.3)	Lx_x father	Lx_x mother	Confusion of sexual identification.
9	Boy	8	"Placement problem; sassy, defiant; damaged property."	Conduct (54.3)	Lx_x God	Sm_x thief	Chronic frustration, martyrdom syndrome.
10	Boy	14	"Reading disability; aggression."	Backward (54.4)	Sm_x woman shot	Lx_x mother?	Maternal rejection with hostility.
11	Boy	12	"Lost interest in school when step-father hospitalized."	Depression (40.5)	Ps_x fear	Lx_x father gone	Reactivating fear of paternal desertion at age 3.
12	Boy	15	"Shot another boy with rifle."	Schizoid (50.1)	Sm_x gunman Sm_x victim	Lx_x self Lx_x twin	Sibling rivalry (successful twin brother).
13	Boy	8	"Poor work; aggression in school."	Conduct (54.3)	Lx_x father	Sm_x fire	Identifies with an angry, aggressive father.
14	Boy	9	"Stuttering."	Speech (54.3)	Sm_x cat	Lx_x mother	Unaffectionate, perfectionistic mother.
15	Boy	10	"Refuses to go to school; stomachaches."	Neurosis (40.6)	Ps_x fear	Sm_x hovering eagle	Hostile compliance to a controlling mother.
16	Boy	12	"Cerebral palsy; immature."	Handicap (54.3)	Sm_x enemy shot	Lx_x parents	Patricidal and matricidal impulse.
17	Boy	11	"Truancy; running away from home of grandmother."	Truancy (54.3)	Lx_x father	Sm_x Mr. Starr	Lacking male identification.
18	Boy	8	"Incorrigible; bickering."	Conduct (54.3)	Sm_x Robin Hood Sm_x knights	Lx_x self Lx_x parents	Defiance toward unjust parental authority.
19	Girl	9	"Fights; threatens to kill."	Low I.Q. (61.0)	Lx_x me, quiet	Lx_x me, fights	Poor impulse control.
20	Girl	7	"Overly emotional; mistaken for rheumatic fever."	Psychosis? (22.7)	Sm_x horse	(self detranced)	Suspicious?
21	Boy	13	"Stutters; wets bed."	Habit (54.4)	Sm_x gorilla	Lx_x step-father	Family tension; fear of step-father.
22	Boy	13	"Stealing; wets bed."	Habit (54.4)	Sm_x suicide	Lx_x father	Fear of father with patricidal impulse.
23	Boy	7	"Speech defect."	Neurosis (40.6)	Sm_x tiger	Lx_x father	Fear of an angry, punitive father
24	Girl	7	"Not happy."	Neurosis (54.3)	Lx_x mother	Sm_x snake	Over-controlling, holding mother.
25	Boy	6	"Jealous; picks on brothers and sister."	Normal	Lx_x elephants	Lx_x lions	(Indeterminate)
26	Girl	8	"Took ring from a store."	Normal	Lx_x me, there	Lx_x me, playing	(Indeterminate)
27	Boy	12	"Temper tantrums, father in mental hospital."	Depression (40.5)	Sm_x robber jailed	Lx_x father	Reacting to paternal hospitalization
28	Boy	11	"Stealing."	Conduct (54.3)	Lx_x brother	Sm_x Russian shot	Sibling rivalry in large family.
29	Boy	8	"Unhappy; moody."	Neurosis (54.3)	Sm_x giant beetles	Lx_x people	Fear of people.
30	Boy	10	"Plays with matches; burned mattress."	Conduct (54.3)	Sm_x murderer Sm_x victim	Lx_x father Lx_x mother	Hostility to physical violence between parents (separated).

understand the general psychodynamics of some of the common neuropsychiatric disorders:

1) *Organic brain syndrome.* Take the common impairment of disorientation with respect to person. For example (with intermediate steps omitted):

$$\begin{array}{l} Kr^{nurse}{}_x \rightarrow Ps^{(tender\ attention)}{}_n \rightarrow Lx^{nurse}{}_x \\ \quad\quad\quad\quad \Downarrow\Uparrow \\ Kr^{wife}{}_x \rightarrow Ps^{(tender\ attention)}{}_n \rightarrow Lx^{wife}{}_x \end{array}$$

The patient with impaired brain tissue function, $Kr^{brain\text{-}OBS}{}_n$, has decreased capacity to integrate and differentiate all the elements of $Kr^{nurse}{}_x$ from the elements of his $Kr^{wife}{}_x$ such that

$$Kr^{nurse}{}_x \rightarrow Ps^{(tender\ attention)}{}_n \rightarrow Sm^{wife}{}_x$$

He therefore mistakes the nurse for his wife, and behaves toward the $Kr^{nurse}{}_x$ as he would toward his $Kr^{wife}{}_x$.

2) *Schizophrenic reactions.* The theory of transformativity suggests, first, that schizophrenic reactions are not a single clinical entity, and second, that schizophrenic thought processes cannot be understood simply in terms of formal logic, or a form of fallacy in formal logic—*i.e.*, the principle of *identity by predicate*, as enunciated by Von Domarus and championed by Arieti (1). Von Domarus' approach denotes a specific level of disturbance in the chain of events from the Co_x to Lx_x in the transformative cycle. This almost vitalistic approach cannot integrate all types of delusional identifications—whether produced by communicative disturbances from a "schizophrenogenic mother," or a molecular disturbance of genetic pattern, or a chemical disturbance due to lysergic acid, or a cellular disturbance as in central nervous system syphilis, or a psychologic disturbance as in chronic anxiety and frustration, or any describable disturbance at any level in the cycle—before the final Lx_x transformation, which is then viewed by the clinician as a schizophrenic production. Von Domarus' principle is satisfactory only as an explanation of schizophrenic disturbance at Lx_n level. Arieti merely replaced the crazy demon of demonology with a neurotic homunculus of psychoanalysis, who deliberately abandons Aristotelian logic, because of anxiety, and purposefully chooses a paleologic, as a comfortable way out for all schizophrenic patients. This, indeed, was an advance in the understanding of psychodynamics in the chaotic days of Freud. It is, nevertheless, an over-simplification, inadvertently blocking an actual understanding of a chain of events in the pathologic psychophysiology of all schizophrenias. Von Domarus' principle rests solely at the level of words (Lx) of deductive logic, whereas inductive logic, controlled experiments and statistical analysis are needed at all levels. The theory of transformativity explains schizophrenias as protean disturbances of verbal and/or motor discharges (Lx_x), caused by faulty transformative processes, and dependent upon the probable pathogenicity of each agent introduced into the cycle. To illustrate: A patient with a "schizophrenic" reaction has a delusion of grandeur in which he identifies himself as Napoleon. It may be easily postulated for this patient at Kr_n level that

$$\begin{array}{l} Kr^{\text{"schizophrenia"}}{}_n \rightarrow Ps^{(power)}{}_n \rightarrow Lx^{?}{}_x \\ \quad\quad\quad\quad\quad\quad \Downarrow\Uparrow \\ Kr^{\text{"Napoleon"}}{}_n \quad\rightarrow Ps^{(power)}{}_n \rightarrow Lx^{Napoleon}{}_x \end{array}$$

With the postulated Kr_n disturbance, he reports his perceptual reality to his relatives, friends or psychiatrist as "I am Napoleon" because

$$Kr^{\text{"schizophrenia"}}{}_n \rightarrow Ps^{(power)} \rightarrow Lx^{Napoleon}{}_x$$

This delusion is then the end-product, logically determined and statistically predictable, and this patient's "schizophrenic" brain may turn out to be simply syphilitic. We can now see that such a delusional identification is possible not only by verbal learning but also by such disturbing agents as spirochetes, sleep deprivation, lysergic acid, alcohol, enzymatic action, molecular derangement, chronic anxiety and frustration, if adequately introduced at a given level in the transformative cycle, though

with *unequal* probabilities to produce the same delusion.

3) *Neurotic reactions.* Let us now apply this theory to a more universal phenomenon in psychoneurotic disturbances. Take, for example, the phenomenon of parataxic distortion (8) of psychiatry in general. I have already demonstrated individual psychodynamics in children in the case reports. We simply analyze as follows:

$$\begin{array}{lll} Kr^{\text{psychiatrist}}{}_x \rightarrow Ps^{(\text{feeling of awe})}{}_n \rightarrow Pm^{?}{}_n \\ \qquad\qquad\quad \downarrow\uparrow \\ Kr^{\text{father}}{}_x \rightarrow Ps^{(\text{feeling of awe})}{}_n \rightarrow Pm^{\text{father}}{}_n \end{array}$$

Patient reacts to the transformed $Pm^{\text{father}}{}_n$ and then behaves accordingly, but not toward the person actually before him—the $Kr^{\text{psychiatrist}}{}_x$. Transference is thus born, and parataxic distortion takes place.

4) *Psychophysiologic reactions.* The theory of transformativity may throw some light on the problems of nosology, especially the areas of psychophysiologic reactions. Here we can see that the fastening of an official diagnostic tag to any patient and his problem is often simply a spotlighting by the professionals of an arbitrary level of the disturbance in the transformative cycle, depending upon the perceptual focus of the patient, together with the professional interest or personal bias of the clinical observer. Take pylorospasm as an example:

$$\begin{array}{lll} Kr^{\text{brutal father}}{}_x \rightarrow Ps^{(\text{pylorospasm})}{}_n \rightarrow \\ \qquad\qquad\quad \downarrow\uparrow\ Sm^{\text{living with a lion}}{}_x \\ Kr^{\text{brutal husband}}{}_x \rightarrow Ps^{(\text{pylorospasm})}{}_n \rightarrow \\ \qquad\qquad\quad \downarrow\uparrow\ Sm^{\text{having cancer}}{}_x \\ Kr^{\text{stern physician}}{}_x \rightarrow Ps^{(\text{pylorospasm})}{}_n \rightarrow \\ \qquad\qquad\quad \downarrow\uparrow\ Sm^{\text{having ulcers}}{}_x \\ Kr^{\text{psychiatrist}}{}_x \rightarrow Ps^{(\text{pylorospasm})}{}_n \rightarrow \\ \qquad\qquad\quad Sm^{\text{cancer phobia}}{}_x \end{array}$$

In this illustration we see not only temporal transformation of a childhood neurosis to an adult one, but also a spatial transformation, in which the disturbance is viewed differently, depending upon the field in which the patient perceives himself.

A further instance: If the physician ($Kr^{\text{stern physician}}{}_x$) is a poor cardiologist, o too much concerned with heart diseases, then with increasing probability, if thi physician must diagnose, and mis-diagnoses:

$$\begin{array}{lll} Kr^{\text{brutal husband}}{}_x \rightarrow Ps^{(\text{pylorospasm})}{}_n \rightarrow \\ \qquad\qquad\quad \downarrow\uparrow\ Sm^{\text{having cancer}} \\ Kr^{\text{poor physician}}{}_x \rightarrow Ps^{(\text{pylorospasm})}{}_n \rightarrow \\ \qquad\qquad\quad Sm^{\text{having heart disease}} \\ \text{Simply, } Kr^{\text{brutal husband}}{}_x \rightarrow Ps^{(\text{pylorospasm})}{}_n \rightarrow \\ \qquad\qquad\quad Sm^{\text{heart disease}} \end{array}$$

Similarly, many adult psychophysiologic reactions are born from the same childhood fears, rekindled by stressful situations in adult life. The physician ignorant of his patient's psychodynamics can sometimes transform the patient's illness from one iatrogenic form to another, but can seldom help the patient to cope with the difficulties, sorrows, and perhaps the lonely terrors of his life.

SUMMARY

A unifying concept of general psychodynamics in the *theory of transformativity* states that linguistic expressions (Lx), symbolic substitutes (Sm) and physiologic sets (Ps) are not separately maintained, but can be transformed into each other, such that

$$Lx \rightleftharpoons (Ps) \rightleftharpoons Sm$$

This relationship can be expanded to integrate all physical, physiologic and psychologic phenomena in terms of a conceptual transformative cycle, originating from the concrete object of matter to the linguistic substitute of the brain in man's relatedness to man. Empirical data on 30 children are offered in the clinical application of a transformative *hypnodiagnostic technique*, together with some references to the classic conditioning of Pavlov and the modern neurosurgical technique of Penfield, in support of the theory as a unifying concept for the speculative psychodynamics of Freud and the general formulations of modern psychiatry and psychosomatic medicine.

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A COMPARISON OF PHYSICIANS' AND NURSES' SYMPTOM RATINGS[1]

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In a recent study physicians and nursing personnel rated symptomatic characteristics of a group of depressed female patients observed during a common rating period (3). These women were new admissions to hospitals of the New Jersey State Hospital System and were under 45 years of age. Analyses of the data revealed that ratings by nursing personnel showed less pathology and less change during the course of treatment than did ratings by physicians. Since ratings by personnel having different kinds and levels of training are often used interchangeably, it is desirable to explore and identify the sources and the nature of these differences. The present study reports such an attempt.

THE RATING SCALE DATA

The study employed the Wittenborn Psychiatric Rating Scales, comprising a set of 52 symptom ratings, each ranging from a nonpathologic level to a pathological extreme (4). The ratings were based on a sample of 100 depressed women, each observed by a nurse and by a physician for a common five-day period at the beginning of hospitalization. The ratings were made independently, and were based on the most extreme pathology noted during the observation period.

The raters comprised a superior group of State hospital personnel selected for participation upon the basis of their interest, reliability and general alertness. To generalize from the results of this analysis, it is necessary for the reader to know something about the background and professional qualifications of these raters.

Almost all of the nurses' ratings were provided by a group of ten persons representing the five hospitals in which patients were under treatment. Most of the ratings were provided by the six registered nurses included in the group. The nurses were generally well prepared, but only one had had an appreciable amount of training in psychiatric nursing. Some of the ratings were provided by psychiatric technicians who served in a nursing capacity. Although all of the raters had had years of experience with psychiatric patients, the formal training of the psychiatric technician requires no more than nine months beyond high school. All raters had been carefully trained in the proper use of the rating scales, however, and received some supervision during the course of their ratings.

Almost all of the physicians' ratings were made by a group of nine raters. All had been carefully instructed in the proper use of the rating scales, and were a part of a relatively stable research team. They were drawn from five hospitals, and had little opportunity for direct interaction. It is probable, therefore, that the rating tendencies which characterize the physicians, as well as those which characterize the nurses, are not an artifact of the situation in which they work, and may characterize other personnel of similar training working in similar settings. None of the physicians was a diplomate of a Board of Examiners in Psychiatry, but five were Board-eligible. All but two had had substantial training and experience in American psychiatry.

[1] This report is based on a comprehensive study of the treatment of depression, supported by U. S. Public Health Grant MY 2525 from the Psychopharmacology Service Center of the National Institutes of Health.

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ANALYSIS OF THE DATA

Table 1 identifies each of the 52 rating scales, and includes the mean of the ratings provided by the nurses and by the physicians and their respective standard deviations. It also includes the correlation coefficient between the nurses' ratings and the physicians' ratings for each of the scales.

A comparative scrutiny of the mean ratings provided by Table 1 will show that the nurses generally rated the patients lower than did the physicians, particularly with respect to such pertinent characteristics as difficulty in sleeping, delusions of guilt, submissiveness, hopelessness, slowing, suicidal thoughts and indecisiveness. These differences are all statistically significant, as are many other less practically significant differences revealed by Table 1. These particular items, with the possible exception of submissiveness and slowing, cannot be rated satisfactorily on the basis of observation alone, and suggest that the nurses may be much less aware of the patient's thoughts and feelings than the physicians are. Whether this reflects differences in opportunity to observe, habits of observation, or interpretation of observation is not altogether clear; probably all of these considerations are involved. Certainly the nurse's duties may not involve her in an exploration of the patient's thoughts and feelings, whereas such factors may be the essence of communication between the physician and the psychiatric patient. This analysis of individual scales leads to the inference that differences in the behavior observed by nurses and physicians may contribute appreciably to the differences in the ratings summarized by Table 1.

The interrater correlations included in Table 1 make it further apparent that the physician and the nurse are often basing their ratings on independent and unrelated considerations. Obviously, some of the low interrater correlations would be a consequence of the restriction of range of ratings resulting from the homogeneity of the sample with respect to the behavior in question. It appears probable, however, that many of the low correlations are a consequence of the different quality or degree of meaning that the ratings have for the physicians and for the nurses. One of the most commonly encountered biases in the use of rating scales is known as the "halo effect," and is characterized by a kind of lack of discrimination. This lack of discrimination occurs in the form of the rater's ascribing a generally high or a generally low status to a given individual without due regard to the distinctions implicit in the content of the various scales. Possibly this form of overgeneralization or lack of discrimination is more prevalent among nurses than among the physicians. A possible tendency for one group to overgeneralize rather indiscriminately could account for some of the relatively low interrater correlations between the two groups.

An examination of the significance of a possible "halo effect" was conducted by the device of intercorrelating all the scale ratings contributed by the physicians and also intercorrelating all the scale ratings contributed by the nurses. If the ratings of the nurses were more subject to the "halo effect" than were the ratings of the physicians, we would expect them to show more relatively high correlations than would those of the physicians. Comparison of the two sets of intercorrelations shows that the intercorrelations among the nurses' ratings are higher than are the intercorrelations among the physicians' ratings. Specifically, 266 of the nurses' scale intercorrelations were above .40, whereas only 117 of the physicians' scale intercorrelations were so high. It would thus appear that the nurses' ratings may be more highly generalized and less discriminating than the physicians' ratings.

It was possible to identify numerous rating scales which, when rated by the nurses, yielded many correlations as high as .40

TABLE 1

Comparison of Doctors' and Nurses' Ratings

	Mean		S.D.		r
	M.D.	Nurse	M.D.	Nurse	MDxNurse
1. Acute insomnia	1.48	0.66	0.93	0.91	0.36
2. Ideas change with rapidity	0.27	0.18	0.56	0.54	.00
3. Unjustified sexual beliefs	0.05	0.04	0.22	0.20	−0.05
4. Obsessive thoughts	0.79	0.89	0.99	1.13	0.10
5. Delusional guilt	1.13	0.48	0.88	0.73	0.36
6. Gives in easily	1.62	1.08	1.03	0.98	0.23
7. Constant movement	0.50	0.16	0.77	0.50	0.18
8. Unaware of feelings of others	0.35	0.52	0.59	0.69	0.32
9. Use of physical symptoms	0.20	0.15	0.49	0.46	0.27
10. Refuses to eat	0.73	0.55	0.80	0.73	0.48
11. Disrupts routines	0.10	0.04	0.30	0.20	0.10
12. Temper tantrums	0.93	0.66	0.74	0.79	0.34
13. Avoids people	0.78	0.70	0.70	0.66	0.27
14. Shouts, sings and talks loudly	0.16	0.12	0.42	0.43	0.06
15. Behavior disrupted by phobias	0.38	0.42	0.68	0.78	0.29
16. Incontinent	0.42	0.16	0.57	0.37	0.16
17. Engrossed in plans	0.15	0.04	0.41	0.24	0.34
18. Feelings of impending doom	0.60	0.54	0.71	0.85	0.26
19. Compulsive acts	0.25	0.26	0.55	0.72	0.29
20. Exaggeration of well-being	0.04	0.05	0.24	0.22	0.15
21. Unable to stick to plan	0.91	0.73	0.75	0.75	0.05
22. Hopeless	1.37	0.89	0.86	0.87	0.31
23. Fears others misunderstand him	0.53	0.39	0.83	0.76	0.07
24. Delusional thinking	0.36	0.49	0.78	0.87	0.18
25. No organic basis for complaints	0.25	0.26	0.55	0.66	0.34
26. Feels systematically persecuted	0.28	0.30	0.51	0.59	0.19
27. Believes others influence him	0.04	0.09	0.20	0.38	0.09
28. Desperately distressed by anxiety	1.37	1.15	0.83	0.94	0.41
29. Organic pathology with emotional basis	0.30	0.27	0.74	0.69	0.29
30. Dramatically attention-demanding	0.47	0.28	0.79	0.66	0.28
31. Minimal overt activity	1.22	0.77	1.05	0.82	0.37
32. Grandiose notions	0.00	0.02	0.00	0.14	0.00
33. Does not believe he has a problem	0.93	1.04	1.00	1.02	0.36
34. Compulsive acts	0.28	0.12	0.58	0.41	0.36
35. Great variation in rate of speech	0.37	0.19	0.64	0.46	0.07
36. Initiates physical assaults	0.16	0.06	0.52	0.28	0.00
37. Abrupt mood changes	0.70	0.70	0.87	0.76	0.12
38. Suicide attempts	1.21	0.40	1.06	0.79	0.32
39. Failures of affective response	0.31	0.30	0.52	0.59	0.05
40. No concern over physical handicaps	0.12	0.07	0.43	0.29	0.57
41. Cannot make decisions	1.35	0.99	0.93	0.95	0.16
42. Opinions exceptional	0.38	0.18	0.72	0.46	0.22
43. Hallucinations	0.08	0.01	0.31	0.10	0.30
44. Memory faults	0.36	0.20	0.64	0.62	0.10
45. Fear of committing abhorred act	0.42	0.32	0.68	0.77	0.26
46. Words not relevant to recognizable idea	0.09	0.13	0.32	0.44	−0.08
47. Shows failure and blocking	1.06	0.84	0.72	0.80	0.24
48. Repudiates earlier insights	0.75	0.18	0.74	0.54	−0.04
49. Speech is stilted	0.24	0.27	0.49	0.51	−0.06
50. Lies or steals	0.14	0.06	0.35	0.34	0.18
51. Exaggerated affective expressions	0.64	0.34	0.94	0.74	0.13
52. Characteristically oppositional	0.34	0.20	0.62	0.49	0.37

with other scales, yet when rated by the physicians for the same sample showed relatively few correlations as high as .40 with other scales. Several scales illustrate this discrepancy quite strikingly. For example, item 14, which is concerned with loud vocalizations, bears a correlation as great as .40 with 13 other scales when rated by nurses, but with only five other scales when rated by physicians. Item 21, concerning inability to stick with a plan, is correlated as high as .40 with 11 other scales when rated by nurses, but shows equally high correlations with only two other scales when rated by physicians. Among the other scales showing such discrepancies are #24 (delusional thinking), #28 (intolerable anxiety), #30 (attention-demanding behavior), #41 (indecisiveness), #47 (blocking and failing), and #52 (oppositional behavior).

Why nurses' ratings should appear to be much less discriminating than physicians' ratings for these scales is not obvious. It is possible that the behavior represented by these particular scales is especially disturbing on the ward, or creates a generally distressing situation for nurses, so that they see this aspect of behavior as related to many other difficult symptoms.

If we consider the 12 rating scales which contribute to the anxiety cluster score (4), we find that the nurses rate them in such a way that they have 85 correlations as high as .40. Since 12 scales can be involved in only 66 different correlations among themselves, some of the 85 correlations obviously involve scales which contribute to other symptom clusters. When we consider the 12 scales for the physicians' ratings, however, we find only 30 correlations as high as .40. It is apparent that the nurses are overgeneralizing in their ratings; whether the physicians are rating too narrowly cannot be asserted with confidence. Comparisons with interscale correlations for other samples are not fully trustworthy because of limited similarity between the samples. Somewhat indicative, however, is the fact that in the Middletown sample, which included an appreciable number of depressed patients, rated with unusual care by the physician responsible for the diagnostic study, the 12 anxiety scales generated only 19 correlations as high as .40 (1). If the Middletown sample is at all a relevant basis for comparison, the physicians providing the ratings for the present study should not be considered as excessively narrow or disjunctive in their observation and rating of anxiety manifestations.

If we consider the eight rating scales contributing to the depression cluster score (4), we find that the nurses rate them in such a way that they have 38 correlations as high as .40. Since eight scales can be involved in only 28 different correlations among themselves, some of the 38 correlations must involve scales which contribute to other symptom clusters. When we consider the same eight scales for the physicians' ratings, we find that only eight have correlations as high as .40. In their ratings of depression symptoms, as in their ratings of anxiety symptoms, the nurses appear to have overgeneralized. If we use the intercorrelations from the Middletown sample again as a basis for comparison, we find that the eight symptom ratings for depression generated 24 correlations as high as .40 (1). This contrasts conspicuously with the eight correlations as high as .40 generated by the physicians' ratings of depression scales for the present sample. This leads to the inference that, with respect to depression rating scales, at least, the physicians providing the present data may have observed and rated on too narrow a basis, and that their depression cluster scores may not have as broad a significance as the depression score based on the ratings for the Middletown sample.

Thus we find that, although the nurses may have overgeneralized in most of their ratings, the physicians may have rated their patients' depression symptoms on too restrictive a basis. Perhaps these differences

between the two professional groups can be reconciled in terms of differences in the roles and circumstances of the two professional groups in a hospital situation where the patient load is heavy and a great burden is placed on all personnel. Specifically, the nursing personnel may overgeneralize on the basis of symptomatic characteristics which are particularly obvious on the ward, and may fail to make distinctions with respect to symptomatic features which could be known only on the basis of an intimate understanding of the needs and feelings which may best be inferred from the interview. The physicians, however, have limited opportunity to observe the patient on the ward (probably less opportunity than the Middletown physicians), and probably make their most valid ratings on the basis of their daily interview with the patient.

SUMMARY AND CONCLUSIONS

Symptom ratings and other observational data provided by the members of different professional groups are often combined or used in some other manner which disregards possible differences in their observational basis or interpretative significance. The practical importance of such possible differences was recently drawn to the writers' attention in a study of the relative efficacy of various ways of treating depressions.

In the present study the possible nature of such differences was examined by an analysis of ratings for 100 women observed by nursing personnel and by physicians during the course of a five-day period. As a consequence of this analysis, three kinds of differences between the ratings of nurses and physicians became apparent:

1) In general, physicians appeared to see and to rate more severe levels of psychopathology than did nurses.
2) The subjective aspects of a patient's illness are more apparent to physicians than to nurses.
3) Relative to physicians, nurses tend to overgeneralize in their ratings of patients, and are less discriminating in reacting to symptomatic distinctions.

These differences are discussed from the standpoint of differences in the responsibility for observation and care which exists in most hospital situations. Specifically, the nurse's observations are guided by the fact that she must maintain ward routine and be sensitive to patient characteristics which complicate her work. In contrast, the physician's opportunity to observe the patient tends to be limited to the examination and interview situation, with its emphasis on subjective considerations. In most State hospitals, the nurse's interest cannot go beyond the physical aspects of the patient's care and progress, whereas the physician's inquiry is almost invariably concerned with how the patient feels and what he thinks.

The possibility that differences in the training of different professional groups, as well as differences in the roles they play in hospital situations, can be a major determiner of differences in symptom ratings is suggested by the broad "halo effect" which was implied by the analyses of the nurses' data. Regardless of differences in training, however, it appears that results from symptom rating scale data should be viewed in the light of the responsibilities of the rater and his opportunity to observe.

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A SURVEY OF MENTAL DISEASE IN AN URBAN POPULATION. V: AN APPROACH TO TOTAL PREVALENCE BY DIAGNOSIS AND SEX

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The reports of the Commission on Chronic Illness on the prevalence of mental illness in Baltimore have led to some misinterpretations, by the lay press as well as by professional media, of the statistic that the prevalence of mental disease is ten per cent in an urban population (8–10). This prevalence figure in the Baltimore study was confined solely to non-institutionalized cases and excluded certain clinical entities, *e.g.*, mental deficiency. In an earlier paper, it was suggested that if these omissions—State, private and Veterans Administration hospital cases—are included, the prevalence rate increases from one case in ten to one in eight (6). This latter rate, of course, is still quite far removed from the statement that three-fourths or more of the population are psychologically impaired, as has been suggested by some studies. It is therefore readily apparent that, even with a one-in-eight distribution, the diseases grouped under the heading of psychiatric disorders are probably as frequent, disabling and costly as any comparable group.

This paper attempts to add a demographic dimension to the data on the prevalence of mental illness. Its concern is with the distribution and implications of psychiatric disorders by diagnosis and sex.

ORIGIN OF DATA

The data to be presented on the prevalence of mental disorders in Baltimore were derived from four sources, the sources constituting a relatively complete assessment of the reported, unreported and publicly institutionalized cases of mental disorder.

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Data on the prevalence of these chronic disorders among non-institutionalized persons were in part derived from the Commission on Chronic Illness, which conducted a questionnaire investigation supported by clinical evaluations of a large number of carefully selected persons in the community.

1) *The Commission on Chronic Illness Report*: This Commission, an independent agency founded jointly by The American Medical Association, the American Hospital Association, the American Public Health Association and the American Public Welfare Association in 1952–1955, conducted a survey of the prevalence of chronic disorders in Baltimore. The research design and references to the various phases of the study, the sample characteristics, and the biases and limitations are detailed in the fourth volume on *Chronic Illness in the United States* (1). The data included in this report are based on a stratified sample of approximately 1200 individuals, of whom 809 responded and were given thorough clinical and laboratory evaluations at the Johns Hopkins Hospital, as well as consultations with the relevant specialties when necessary. By the proper application of weights, the 809 evaluees were found to be distributed almost identically by age, color and sex with the Baltimore population, so that the rates to be described, with certain limitations, may be deemed to be representative of the non-institutionalized Baltimore population. A miscellaneous group of childhood behavior disorders, mild mental defects, alcoholism and other minor personality or behavior difficulties which had an adjusted rate of 15.2 per thousand is excluded from this report because it was felt

that the judgments of both examining physicians and psychiatrists were probably not very reliable, and better sources of data exist in other studies.

2) *Study of Prematures*: In another study, 500 prematurely born infants and an almost similar number of full-term controls born in Baltimore in 1953 were examined at approximately 40 weeks of age at the Johns Hopkins University School of Hygiene (3). This sample was adjusted to the Baltimore infant population by controlling for the rates of prematurity, race, sex and socioeconomic status. On this basis, a total rate of 15 per thousand mentally defective infants was derived (2). These are the organically impaired mental defectives, and do not include the socioculturally and educationally retarded children. Inclusion of the latter would result in the estimates of four to 14 per cent found in the school-age population.[2]

It might be added that re-examination of the children at three years of age confirmed these rates, and also indicated the high reliability of the infant examination procedures. While the prevalence rate of 15 per thousand is for a pre-school age population, it is not too unsafe to use it for the total population, since little or no improvement in intellectual functioning can be anticipated for these children. Because a number of these cases may be expected to be removed by death, clinical judgment leads us to believe that the rate constancy of this diagnostic category will result from the addition of brain-damaged individuals who, at later ages, will be pushed down into the definitely defective and severely impaired group by the interaction of sociocultural and organic factors.

3) *Institutional Rates*: A third source of data on mental disorders was those Baltimore residents hospitalized as of June 1, 1954, consisting of all of the individuals in the three State mental institutions admitting patients from Baltimore and from private hospitals. Unfortunately, hospital census recording did not include city of residence, so the data had to be secured laboriously by hand from the hospital records.

4) *Veterans Administration Facility Rates*: A frequently ignored source of data, particularly when institutionalized cases are considered, is the Veterans Administration facilities. This is a common source of bias, particularly when sex and age differences are considered. We were fortunate in being able to use the data of a 50 per cent systematic sample of the Baltimore residents of the Veterans Hospital serving the Baltimore area.

FINDINGS

A summary follows of the findings in terms of prevalence by diagnosis and sex:

1) *Psychoses*: Most reports of the distribution of the psychoses by sex have been based upon first admission data to State hospitals. The rates for such admissions were and are higher for females (4). To explain this differential rate, any number of constitutional, psychologic and social variables and hypotheses were suggested. Females were postulated as weaker biologically, and as subject to greater psychologic stress because of the shifts from mother to father figure, and because of the hypothesized penis-envy problem. The most logical of social explanations suggested that, when a wife and mother fell ill, there was no one at home to care for her, since the breadwinner was out earning a living. Because a wife could care for her husband, men tended to remain in the community to a greater extent than did women. Also, in a male-dominated society, many more women than men failed to marry. The status of the single, widowed or divorced female may in itself represent a stressful situation; when sick, her status is

[2] Since these sociocultural retardates are not mentally ill or primarily medical problems, it was deemed inadvisable to include them in any total prevalence picture. Infancy is thus the ideal age during which organic impairment can be differentiated from the psychologic effects of an impoverished and deprived environment.

TABLE 1

Prevalence of Mental Disorder in Baltimore as a Rate per 1000 Persons by Diagnosis, Sex, and Source of Data

Diagnosis	Total Rate	Non-Institutional			State Hospitals‡			Private Hospitals‡			V. A. Hospitals§			Total	
		No. of Cases Unweighted	Rate		No. of Cases Unweighted	Rate		No. of Cases Unweighted	Rate		No. of Cases Unweighted	Rate		Male	Female
			Male	Female		Male	Female		Male	Female		Male	Female		
Psychoses	8.81	17*	6.00	2.70	3705	3.76	3.91	170	0.10	0.24	239	1.02	0.02	10.88	6.87
Psychoneuroses	52.69	51*	35.60	68.00	45	0.04	0.05	14	0.01	0.02	7	0.03	—	35.68	68.07
Psychophysiologic, Autonomic and Visceral Disorders	36.50	18*	18.90	52.40	—	—	—	—	—	—	—	—	—	18.90	52.40
Acute Brain Syndromes	0.14	—	—	—	124	0.24	0.03	4	0.01	—	—	—	—	0.25	0.03
Mental Deficiency	15.00	26†	25.90	6.20	—	—	—	—	—	—	—	—	—	25.90	6.20
Total	113.14	112	86.40	129.30	3874	4.04	3.99	188	0.12	0.26	246	1.05	0.02	91.61	133.57

* Based on clinical examination of a stratified sample of 809 individuals in the survey by the Commission on Chronic Illness in Baltimore in 1952–1955 and adjusted to the Baltimore population.

† Based on clinical examination of a stratified sample of 992 infants born in Baltimore in 1953 and adjusted to the Baltimore population.

‡ All Baltimore residents in the Maryland State and private hospitals as of June 1, 1954, taken from the hospital records.

§ Based on a 50 per cent systematic sample of the Baltimore residents in the Veterans Administration Facility serving the Baltimore area.

often further impaired, with hospitalization frequently representing the only feasible recourse. The trouble with these hypotheses is that, apart from their surface validity or lack of it, they are largely unnecessary: as the data in Table 1 indicate, male rates exceed female rates in the ratio of five-to-three in the Baltimore population.

The Baltimore data indicate that the non-institutional rates are more than twice as high for males as for females—6.00 cases per 1000 males as opposed to 2.70 per 1000 females. The comparable State hospital rates for males and females per 1000 persons are 3.76 and 3.91; the private hospital rates, .10 and .24; Veterans Administration hospital rates, 1.02 and .02. The total male rate of 10.88 per 1000 persons is therefore substantially greater than the female rate of 6.87.

Indeed, even if the non-institutional rates, which are obviously derived from a small number of cases and therefore likely to be unstable, were omitted from consideration and only the total institutional rates compared, male rates would exceed female rates. The former are 4.88, the latter, 4.17. This difference is sufficiently small that *post hoc* explanations seem unnecessary. Variability in diagnosis probably has little bearing on these rates, since a psychosis usually presents symptoms of a florid nature.

2) *Psychoneuroses and Psychophysiologic, Autonomic and Visceral Disorders*: It should be apparent from Table 1 that: a) these classes of disorders are largely to be found outside of hospital settings; b) the total prevalence rate for these disorders is nearly nine per cent; c) the psychoneuroses rate for females is almost twice that for males; d) the psychophysiologic-autonomic-visceral disorders are encountered almost three times as frequently in females as in males.

Caution should be exercised in interpreting these data, since the findings are based

upon small numbers of cases. Despite this limitation, the rate disparity between males and females determined in this investigation has been described by others and does not seem extreme. In view of supporting data from others, an attempt at a *post hoc* explanation of this rate discrepancy is in order. One of the possibilities which should be investigated is that the admission of emotional and psychologic difficulties, fears and anxieties is not aceptable for men in our culture but is, within limits, permissible for women. As a consequence, both the psychoneuroses and the psychophysiologic disorders which involve reporting of these symptoms would be missed much more frequently in men than in women. Again, since these disorders are sometimes accompanied by alcoholism or other complications, it is not unlikely that other diagnoses—*e.g.*, acute brain syndrome and behavioral and personality disorders—will be preferred to psychoneurosis and psychophysiologic disorders.

3) *Acute Brain Syndromes*: The diagnosis of acute brain syndrome is almost wholly secondary to alcoholism, and therefore should be much more frequent in males than in females. The Baltimore data indicate that there were no non-hospitalized cases in which this diagnosis was made. In the hospitalized population the rate for these disorders is only .14 per 1000. Of this small number of cases, the rate for males exceeds that of females by approximately eight-to-one.

The most logical *post hoc* explanation for the preponderance of males is that it reflects alcoholism rates. A premium is placed in our culture on the use of alcohol by the male. It is frequently—and, at certain class levels, an integral—part of his occupational and social life, and fewer restraints encumber male drinking. Inasmuch as drinking is encouraged as a symbol of "maleness," and as a prelude to and an accompaniment of interpersonal relationships, and is an institutionalized method of escaping the vicissitudes of ordinary existence, the higher male rates are hardly surprising.

4) *Behavioral and Personality Trait Disorders*: Table 1 does not contain any estimate for that sizable but poorly defined group of conditions coming under the rubric of behavioral and personality disorders. These diagnoses were so unclear and proved to be so unreliable in the chronic-illness survey that they were omitted from consideration in the reports of this survey. However, on the basis of data in our study of behavior disorders in children, a crude estimate of a prevalence rate of 10 to 15 per thousand was derived for the Baltimore population (12). While this total rate may be somewhat unreliable across age groups, the distribution by sex appears to be stable. The male rate ranges from twice to six times that for females. This rate difference is particularly noteworthy for children who are hyperactive, confused and disorganized—symptoms often closely associated with brain damage (11). It is tentatively suggested that this hypothesized greater frequency of brain damage in males may serve as one of the predisposing elements in the precipitation of psychoses and, in turn, for the significantly higher rates for psychoses among males. This postulated sequence of causality is of course extremely tentative, and requires much more testing.

5) *Mental Deficiency*: The case for the postulated relationship of brain damage as a predisposing factor in the psychoses and personality trait disturbances is even stronger in the area of mental deficiency. For one thing, almost every epidemiologic investigation of the incidence or the prevalence of mental deficiency has reported higher rates for males (5). Our Baltimore findings are in full accord on this point. They reveal, first, a prevalence rate of 1.5 per cent, and, second, a ratio of four-to-one of males to females. This great discrepancy may be due in part to the instability inherent in a study of a small number of cases.

At any rate, this higher male rate is also

to be found in a number of other conditions which have been thought to be associated with the precursors (*e.g.*, prematurity) of prenatal brain damage. In earlier studies of children we found this to be true for cerebral palsy, epilepsy, behavior disorders and tics (7). The same findings are apparently present throughout the continuum of reproductive casualty. Fetal death, stillbirth and neonatal deaths are all much more common in males than in females. This suggests that there may be some factor which leads to more frequent injuries to the central nervous system of male fetuses. Whether this lies in the germ plasm of the male or—much more likely—in some incompatibility between the male fetus and the female mother, or in some other as yet unidentified mechanism, is purely conjectural. What is not conjectural is the finding of higher impairment rates for males across a wide spectrum of conditions. So significant is this finding of more frequent male impairment that real effort should be exerted to establish the causative mechanisms, and thus prevent much of neuropsychiatric disorder.

SUMMARY

A number of epidemiologic investigations conducted simultaneously on samples of the Baltimore population permitted an approach to a realistic estimate of the total prevalence and sex distribution for different diagnostic categories of mental illness in this urban population. Some hypotheses and explanations are offered with regard to the sex distribution of disorders ranging from the psychoses to mental deficiency.

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A LONGITUDINAL STUDY OF THE ELECTROENCEPHALOGRAPHIC AROUSAL RESPONSE IN DEPRESSED PATIENTS[1]

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The electroencephalographic arousal response is well known to be globally correlated with the psychologic process of attention (2). The present investigation represents an attempt to specify relationships between certain characteristics of the arousal response and aspects of the attentional process.

From the standpoint of the electroencephalogram (EEG), the blocking of alpha rhythm in response to discrete environmental stimulation (the arousal response) has at least three characteristics. If alpha-blocking occurs, the EEG records 1) the occurrence itself, 2) the latency, and 3) the duration of the occurrence.

The possible relationship of these three EEG characteristics to the psychologic process of attention can be explored by making certain assumptions:

1) The suppression of alpha activity in response to discrete environmental stimulation indicates the registration (effects) of such stimulation in the central nervous system; if so, the presence or absence of alpha-suppression could describe the attentional threshold of the subject at the time of stimulation.

2) The latency of alpha-suppression reflects the promptness with which the stimulation is registered—if so, it (latency) is a measure of the rapidity with which the alerting response is made.

3) The duration of alpha-blocking indicates the length of time the orienting mechanism is occupied by stimulation—colloquially, the amount of time the person or animal *pays attention* to stimulation.

Thus, on the basis of these assumptions, the EEG arousal response may supply information concerning the threshold of alertness, the promptness of the alerting response, and the length of the orienting process.

In the present study these elementary (and probably oversimplified) suppositions were applied to an analysis of the EEG arousal response of depressed patients, a psychiatric group whose attentional deficits seem fairly obvious.

A patient in a classic state of retarded depression exhibits what is called "psychomotor retardation"—that is, the person thinks, responds and moves more slowly and laboriously than had been his custom. Depending upon the severity of the depression, he may also manifest disturbed sleep, decreased appetite, and decreased performance of sexual (genital) activities. The depressed person seems in general to be self-absorbed and preoccupied, with a corresponding impairment in attention or alertness to environmental stimulation. The presence of an apparent attentional deficit and the probability of a fairly rapid clinical recovery make depressed patients particularly suitable for a longitudinal exploration of relationships between characteristics of the arousal response and aspects of the attentional process. On the basis of the assumptions stated earlier, certain changes should be predictable in the arousal response of these patients as they move from

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depression to clinical recovery. These changes are stated below as hypotheses.

1) If the depressed patients' thresholds for responding to environmental stimulation are higher than usual during depression, then the arousal response (evoked by environmental stimulation) should occur less frequently during depression than upon recovery.

2) If peripheral rate of responsiveness is retarded during depression, then the *latency* of the arousal response should be longer during depression than upon recovery.

3) If central responsiveness and integrative activities are retarded during depression, then the *duration* of the arousal response should be longer during depression than upon recovery.

PROCEDURE

Subjects: Eleven male and female state hospital patients whose primary diagnosis was "depressive reaction" or "psychotic depression" (manic phase excluded) composed the subject population. The sex, age, diagnosis and type of therapy are presented for each patient in the first four columns of Table 1. None of the patients was physically ill or mentally defective.

Method: Each *S* was seen twice—within three days of admission, and within four days of discharge. At these times *S* was given a modified version of the "Depression Scale" of the Minnesota Multiphasic Personality Inventory (MMPI) and a "waking EEG." The results of the MMPI served to "quantify" the degree of *Ss*' depression when they were ill and recovered, thus supplementing clinical impressions.

The electroencephalograms were obtained by an 8-channel Grass machine, using conventional lead placements and needle electrodes. Single light flashes from a Grass Photic Stimulator were used to elicit arousal responses while the *S* reclined (eyes closed) in a supine position. (The procedure followed in detail that described by Wilson and Wilson (3).) All the arousal response measurements reported in this study were recorded from the right parieto-occipital leads. *Arousal latency* was measured as the interval between the light flash and the start of alpha-blocking (*i.e.*, from the flash to the last alpha wave before blocking of alpha activity). *Duration* was recorded as the interval between the last alpha wave following the flash and the first of three consecutive alpha waves after blocking. All times were recorded to the nearest .01 sec. Finally, the total number of arousal responses over the total number of light flashes was tabulated for each record.

RESULTS

Each *S*'s performance on all measures used in the study is presented in Table 1, together with the group totals and the results of the statistical analyses. (The advantage of presenting all of this information lies in its making individual variation open to scrutiny, a possibility sometimes neglected when only group totals or central tendencies are stressed.)

Table 1 shows that the mean depression scale score of *Ss* was considerably lower (from 52 to 22) upon recovery from their depressive illness (*i.e.*, the patients were significantly less depressed upon discharge from hospital). In addition, *each* individual showed a decline in his depression scale score. As none of the patients was hospitalized more than 60 days, these findings indicate a fairly rapid and dramatic change in their psychologic state over that period of time.

The occurrence of alpha-blocking over the total number of photic stimulations is presented in the last two columns of Table 1. As can be seen, eight of the 11 *Ss* manifested more frequent alpha-blocking upon recovery. This result did not, however, achieve statistical significance ($p = .11$). For statistical significance, according to the Sign Test, *nine* of the 11 patients would have had to show the change ($p = .03$). The sex, age, diagnostic and treatment data

TABLE 1

Summary of Data

Patient	Sex	Age	Diagnosis	Treatment	Depression Scale Score		EEG Arousal Response					
							Mean Latency (sec.)		Mean Duration (sec.)		No. of Alpha-Blocks over No. of Light Flashes	
					Ill	Recovered	Ill	Recovered	Ill	Recovered	Ill	Recovered
J.M.	M	52	Psychotic depression	ECT	56	21	0.10	0.10	0.95	0.69	21/33	20/108§
S.W.	M	59	Psychotic depression	ECT	63	17	0.11	0.12	0.48	0.69	7/34	65/130
B.D.	F	58	Depression reaction	drug	—	26	0.11	0.13	0.57	0.73	9/13	17/33
R.J.	F	51	Psychotic depression	drug	37	16	0.13	0.07	0.97	0.60	30/121	33/107
L.I.	F	40	Depressive reaction	ECT	64	16	0.08	0.10	0.86	0.68	23/107	65/120
V.P.	F	38	Depressive reaction	ECT	48	14	0.06	0.10	0.87	0.51	3/101	18/118
L.H.	F	49	Psychotic depression	drug	47	24	0.11	0.11	0.63	0.70	30/140	30/133
R.E.	M	21	Psychotic depression	ECT	55	12	0.11	0.11	0.69	0.53	31/122	10/23
J.S.	M	56	Depressive reaction	drugs	40	16	0.13	0.12	0.84	0.71	26/113	17/115
J.M.	F	37	Depressive reaction	drugs	62	59	0.09	0.10	0.51	0.52	17/132	27/127
B.I.	F	48	Psychotic depression	ECT	51	25	0.15	0.13	1.21	0.74	12/94	38/123
					M = 52.30	M = 22.36*	0.11	0.11†	0.79	0.64‡	208/1110	340/1137

* The mean depression scale score of the patients when recovered was lower than the mean score during illness ($p < .005$, *one-tailed* probability).

† No change in mean latency.

‡ The mean duration of alpha-blocking was shorter upon recovery than during illness ($p < .05$, *one-tailed* probability). Counter to the predominant trend, four of the 11 patients manifested longer durations of alpha-blocking upon recovery (patients S. W., B. D., L. H. and J. M.).

§ Eight of the 11 *Ss* showed more frequent alpha-blocking upon recovery. According to the Sign Test, however, this finding fails to achieve statistical significance ($p = .11$). (Patients J. M., B. D. and J. S. showed less frequent alpha-blocking upon recovery.) In some instances, less than 100 photic stimulations were presented during a session, such sessions being prematurely terminated to make the EEG machine available for critical or emergency purposes.

yield no ready explanation for the failure of the three individuals to follow the general trend. As can be seen from the group totals, the proportion of arousal responses upon recovery was almost twice the proportion evinced during illness.

Columns 8 and 9 of Table 1 show that the mean latency of the arousal response of the group remained unchanged upon recovery. The particular figures of .11 sec. ("ill") and .11 sec. ("recovered") are in the range reported by other investigators for different types of *S* populations (1). This finding suggests the stability of the latency aspect of the EEG arousal response.

Perhaps the most striking difference in the arousal response from the "ill" to the "recovered" states was found in its duration (columns 10 and 11 of Table 1). The mean duration of the group changed from .79 sec. during illness to .64 sec. upon recovery ($p < .05$)—that is, the duration of alpha-suppression was shorter upon recovery than during the depressive illness. Though the difference between the group means was statistically significant, four of

the 11 *Ss* did not manifest a shorter mean duration of alpha-blocking upon recovery. Sex, age, diagnosis and treatment were not correlated in these four patients, so that their deviation from the average trend does not seem readily explainable.

DISCUSSION

Hypothesis 1 stated that, if depressed *Ss*' thresholds for responding to environmental stimulation are elevated during the illness, alpha-blocking should occur less frequently during depression than upon recovery. Eight of the 11 *Ss* in the present study showed more frequent alpha-blocking upon recovery, and the proportion of arousal responses of the group upon recovery was almost twice the proportion evinced during illness. Thus, there was some support for the notion that a person's threshold for responding to environmental stimulation is more elevated during depression than during his more customary functioning. This problem can be examined further by utilizing stimulation in a physically graded series, rather than the physically unchanged stimulation employed in the current study.

The question arises as to whether we are dealing only with an elevation of the threshold for *environmental* stimulation, or a *generalized* impairment of arousal level. Specifically, has the lowered environmental attentiveness resulted from a focal shift of attention from the environment to "internal" stimulation, or is there also an impairment in awareness to the "inner" aspect of stimulation? The arousal response is usually defined in relation to environmental stimulation, and as a consequence there seems to be no ready way to search for the electroencephalographic answer to this problem. For the present, observations of depressed *Ss* suggest that reduced environmental attentiveness is correlated with heightened introspective concern.

Hypothesis 2 stated that, if peripheral rate of responsiveness is retarded during depression, the latency of alpha-blocking should be longer during depression than upon recovery. In the present study there was no change in mean latency at the time of recovery. The failure of the results to confirm the prediction from Hypothesis 2 suggests that, if environmental stimulation is suprathreshold (see Hypothesis 1), the arousal response occurs with the same promptness during illness as at the time of recovery. In other words, the arousal response occurs relatively swiftly or not at all (akin to the "all-or-nothing" law concerning the transmission of nerve impulses). And during depression, as already noted, the arousal response would seem less likely to occur.

Hypothesis 3 stated that, if central responsiveness and integrative activities are retarded during depression, the duration of the EEG arousal response should be longer during depression than upon recovery. The performance of seven of the 11 patients was in accord with this hypothesis, and the mean duration of alpha-blocking for the group was significantly shorter upon recovery than during illness. These findings offer some mild support for the idea that the duration of alpha-blocking may represent the temporal span of the orienting process. They also suggest that the orienting mechanism operates more efficiently when the patient has recovered from the depressive illness—that is, the environmental stimulation (or incoming "signal") may be processed in a temporally shorter order upon recovery than during illness. This increase in temporal efficiency coincides with the waning of the psychomotor retardation observed upon recovery from depressive illness.

In general, the findings of this study have indicated certain reversible changes in brain function during depressive illness. The nature and direction of the changes were in general accordance with predictions made from hypotheses concerning the attentional deficit manifested by the particular psychiatric *Ss* in question. The findings offer

some support for the thesis that certain characteristics of the EEG arousal response are definitively related to aspects of the attentional process. The specific assumptions underlying these relationships require broader testing before they can be accepted or rejected.

SUMMARY

The purpose of the present study was the exploration of certain relationships between characteristics of the EEG arousal response and aspects of the attentional process. Accordingly, the occurrence, latency and duration of the EEG arousal response were recorded in 11 depressed *Ss* during their illness and upon recovery. Eight of the 11 showed more frequent arousal upon recovery, whereas latency was unchanged, and the average duration of the arousal response was foreshortened. These results seem consonant with the suppositions that, during depression, attentional threshold is higher and central integrative processes are slower than is usual with the patient. The findings also offer some support for the thesis that the occurrence and duration of the arousal response are respectively related to the threshold of alertness and the temporal span of the orienting process.

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DREAMING, ALTERED STATES OF CONSCIOUSNESS AND THE PROBLEM OF VIGILANCE[1]

MONTAGUE ULLMAN, M.D.[2]

Whereas most theories of dreaming (8) touch on some aspects of the connection between dreaming and the sleeping state, only an occasional view has been advanced emphasizing the connection of the dream with arousal or alerting processes (4). Freud, recognizing the alerting aspects of dream consciousness, went on to develop the theory of the sleep-maintaining effect of dreaming, and, further, the idea of a specific function of the dream: to preserve sleep. The concepts of wish-fulfillment and disguise emerged as integral parts of the guardianship of sleep function. The experimental studies of Kleitman and his associates (1, 2, 5–7) call attention to the occurrence of repeated partial awakenings during the sleeping phase of the sleep-waking cycle. That these repetitive, abortive bouts of awakening have been found to be associated with dreaming suggests the possible relationship of dreaming to the vigilance needs of the sleeping organism. The applicability of the concept of vigilance to dreaming and other states of altered consciousness will be explored.

VIGILANCE AND DREAMING

Liddell (10) emphasized the role of vigilance in his studies on induced neuroses in animals: "We know that even the simplest mammal, wild or domesticated, must at all times be asking both of our questions—'What is it?' and 'What happens next?' Vigilance and planning are, of necessity, dynamically inseparable." He makes the following interesting conjecture on the relation of unconscious processes to vigilance: "We may imagine that early in each person's life his stream of experience branches and the life of immediate awareness diverges from the life of unawareness. A dynamic barrier, as Freud suggested, now separates conscious from unconscious. Why is this? May it not be that the young child can freely communicate certain experiences, thoughts and fantasies, while others incite in him a state of primitive vigilance because of fear of punishment, of loss of love? These repressed materials of the unconscious may be thought of as detonators of wasteful visceral reaction and must, therefore, be cautiously dealt with by the organism. Conscious and unconscious then become matters of social communication—ease of communication or impossibility of communication."

The human organism shares with lower forms of life this need for vigilance. Unique in the human, however, are the manner and form of vigilance operations. Behavior, consciously directed in the waking state, is geared toward the maintenance of relatedness to the social environment. Potential threats arise out of the context of social existence, and the diffuse ramifications of the threat extend to experiences that expose the flaws, gaps, inadequacies and misconceptions of consciousness. Such threats now extend to any experience that challenges value systems, social status or psychologic mechanisms of defense. In the everyday experience of the human being, threats of this nature overshadow direct threats to physical existence. While he is awake, vigilance is tempered by adequate conceptualization, communication and be-

[1] Based on clinical data from a study of cerebral vascular disease conducted at the Second (Cornell) Neurology Service, Bellevue Hospital, and supported by Grant No. B-2352, National Institute for Neurological Diseases and Blindness, U. S. Public Health Service.

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havior. In the neuroses and psychoses there are disturbances in all these areas. Vigilance operations are then attended by chronic anxiety states, autistic thought processes and organ pathology.

The problem of vigilance comes into focus more sharply in connection with the sleep-wakefulness cycle (14): "The necessities which confront the human organism in connection with sleep are of a twofold nature. With the inception of the sleeping state there arises the need to effect a radical transformation in the activity of the individual. Social orientation and relatedness to the external environment give way to a form of activity governed primarily by physiological needs and hence occurring at an involuntary level.

"Similarly, the transition from sleep to wakefulness in response to any stimulus of sufficient strength impinging upon the organism is characterized not simply by the process of awakening, but more significantly by the resumption of consciousness of one's social existence. In the human being these significant stimuli now include symbolic as well as direct sensory effects. The state of vigilance during sleep has shifted from one involving danger to the organism at an animal level, *viz.*, in terms of physical attack, to one involving danger to the organism in its relatedness to society."

The executive function of the brain is at every moment contingent upon the arrival of an endless supply of orienting afferent stimuli. Consciousness is a measure of the capacity to integrate these stimuli and organize appropriate motor responses. In states of partial awakening, the functioning of the brain becomes radically altered. It mobilizes the current or residual experience of the individual in a manner that, in effect, makes the cumulative store of past as well as currently acting experience a source of afferent stimuli—afferent not to the higher centers, but to the reticular activating system in the service of eventual arousal (13). This provides a means (and the only means) whereby the human organism can participate in a process that has come about by forces beyond its control and foreign to the ego: the involuntary alterations in the depth of sleep, and the associated variations in the level of cortical activation. In sleep, concomitant with the alteration in afferent inflow, the content of consciousness becomes experiential[3] in nature, concrete in form, and meaningful in terms of the vigilance needs of the individual. The person is unable to relate a stimulus, or the absence of an accustomed stimulus, to the appropriate environmental setting. Past memories are brought to bear in the situation, not haphazardly, but so organized as to relate to the currently disturbing stimulus, whether physical or psychologic. The resulting presentations have a potentiating or arousal effect upon the brain, alerting the individual in proportion to the strength of the stimulus and, in this sense, preparing him for the next higher order of consciousness, namely, waking consciousness (regardless of whether it occurs). It is in this light that the dream may be considered to be adaptive, functioning to regulate, within limits, the unstable equilibrium that exists during the transitional periods of consciousness. The effect is generally toward arousal, but, when arousal fails to materialize, the dream then reflects the return to sleep.

The concept of the sleep state as a release phenomenon is open to question. In sleep there is simply an alteration in the mechanism and the goal of the thought processes. Neither of these two differences, however, changes the basic social character of

[3] The terms *experiential* and *referential* are used in the sense described by Weinstein *et al.* (16), based on Sapir's classification of symbols: "Referential symbols include such forms of language as letters, numbers, and signals that are universally agreed upon as conveying certain specified information. Condensation symbols or experiential symbols are those which express a particular relationship of the person to the object or event."

thought. By this I mean that thought, whether it be verbal, logical and referentially cued, or sensationally illogical and experientially based, still serves a social function and remains in its essence an active process of comprehension, leading to refinements in behavior and ultimately to mastery of the environment. Admittedly this is so in waking thought. It is also true of thought occurring during altered states of consciousness, although this may be more difficult to perceive. The main difference lies in the fact that, in the first instance, thought is directed toward external behavioral change, whereas in the second it may be considered to be directed toward inner change in the form of potentiating cortical processes in the service of vigilance. Waking thought is oriented to the changing pattern of current responses; dream thought cuts through the longitudinal history of the individual and, like a magnet, clusters about itself relevant historical data from different epochs in the life of the individual (12). In this manner, the full implications of a currently disturbing stimulus are both explored and stated in concrete terms. Depending upon the nature of the stimulus, the intactness of the psychologic defenses, and the need for sleep, full arousal may or may not result. The dream is a reflection of precisely the same struggle that characterizes waking consciousness—a struggle between the effects of a complicated and often unpredictable world, and the feeble efforts to bring order out of chaos by the symbolic interpretation and comprehension of the nature of the external world and the individual's relatedness to it. The essential difference is simply that, in the one case, the individual is developing his comprehension of current stimuli; in the second, he is struggling to arrive at that level of consciousness where this becomes possible. Neither wish fulfillment nor disguise is an important element in either circumstance.

Thus considered, dreaming becomes a form of orienting activity and not a disguising mechanism. It is the conscious orientation to the passively experienced movement into or out of the transitional states occurring during the course of sleep. It is an accurate reflection of the existing stimuli, including the psychologic, impinging upon the organism at the time—accurate not in the sense of logical, syntactic or reproductive felicity, but in the sense of assessing the strength of that stimulus at a given level in the sleep cycle. The dream, concerned as it is with the possible need for arousal as well as the need for continued sleep, may be said to subserve a function concerned with vigilance, rather than one concerned with the guardianship of sleep.

ALTERED STATES OF CONSCIOUSNESS AND VIGILANCE

From a neurophysiologic point of view, sleep has been regarded as analogous to a state of relative de-afferentation (9). Hallucinatory and dreamlike effects have been noted in many other situations where there is interference with the effective reception and integration of sensory stimuli. Such interferences may operate peripherally—as in visual hallucinations associated with bilateral cataracts (3)—anywhere along the pathways transmitting afferent impulses (phantom limb), or at the cortical end-stations analyzing and integrating incoming sense data, as in the case of brain damage. These impulses are generally thought of in physical terms. The concept may also apply to stimuli ordinarily regarded as essentially psychologic in nature, such as thought processes. One such clear application at the psychologic level is illustrated by the schizoid maneuver defined by Silverberg (11) as "the attempt to deal with reality in terms of distorting or falsifying its perception or its meaning, so that a murderous enemy becomes a friendly dinner-companion, his gleaming sword a spoon or a silver bowl or the waters of a fountain." Other, more limited applications might include sensory disturbances brought about

by post-hypnotic suggestion, or occurring as a conversion symptom in hysteria.

In each instance referred to above the individual is simply forced to use different aspects of his experience, expressed in a different mode and toward different goals. He is not aware, or not clearly aware, of all—or of a certain segment—of experience. The true explanation either is not available or is overshadowed by the felt reactions, and a confabulated explanation presents itself, arising out of experiential sources and directed toward the maintenance of a unified feeling of self. The alterations in the form and content of consciousness that characterize dreaming may be taken as the prototype for the disturbances in consciousness which follow in the wake of the varied conditions referred to above.

The work on denial of illness in patients with organic brain disease brings into focus some interesting adaptive capacities of the human organism (15). Brain-damaged patients present, in varying measure, disturbance in their capacity to orient themselves accurately to their illness, as well as to aspects of their reality situation. What emerges in the form of partial or marked objective disorientation is the paradoxic resultant of the individual's effort to maintain an orientation in the face of his disability. This may become manifest in a variety of ways, but all form part of an experiential pattern of thought, rather than a referential one. It might be described as a situation in which the individual confronts himself, as well as others, with an autistically created environmental response at precisely those points where effective sensory integration and appropriate motor participation are no longer possible.

CASE REPORT

A 50-year-old Italian-born female, hospitalized following an embolus to her right middle cerebral hemisphere, was seen one week after admission, at which time she had a residual left hemiparesis. In addition to the motor deficit, she had a left hemisensory syndrome and left hemanopsia. The electroencephalogram was reported as showing diffuse abnormality. When asked where she was, the patient confabulated, naming another hospital and saying that the hospital was located around the corner from where she lived. When asked what was wrong, she denied that she was ill. Pressed further, she stated that her doctor had told her to come in for an operation on her heart. (She had rheumatic heart disease. An operation had been advised several months earlier but had been refused.) Asked if she could move her left arm, she said she could. When asked to do so, she raised her right arm. When the examiner pointed out that her left arm did not move, she said it was not her arm but her husband's, and that he liked to caress her. At this point she raised her left arm by means of her right hand and began stroking her breast. When she was reminded that her husband was dead, she said that he liked to come back and caress her because he liked her so much.

By the following day the picture had changed somewhat: the same type of disorientation was present, but the patient now admitted that the left arm was hers, referring to it in the third person and saying that it wouldn't listen to her. She insisted that her dead husband was lying in the next bed.

Several days later the sexual theme was elaborated in a different way. Her dead husband was no longer in the scene, but the nurses were doing things with the other patients. Some of the patients were really men. The nurses would put screens around the beds. slip their hands under the sheets, and play with the men for hours on end. The patient reacted with fear, and called the ward a "jungle," because it frightened her just as if it were inhabited by wild animals.

To recapitulate some of the denial mechanisms shown by this patient:

1) Confabulation. She fabricated data

bout the hospital and the circumstances of er admission.

2) Spatial disorientation. At different imes she spoke of her home as being around he corner, upstairs, and so on.

3) Temporal disorientation. The passage f time was confused at two points—in re- ation to her dead husband, and in relation o the operation.

4) Explicit verbal denial. The occurrence nd aftermath of the stroke were denied *n toto.*

5) Hemispatial inattention. The patient persistently looked away from the affected side.

What can be learned from this sequence of events—so similar to ordinary dream sequences, but occurring in the waking state—that may shed further light on dream mechanisms? The events occurring in the wake of the stroke might be reconstructed as: A sudden deflection of the afferent inflow is followed by the fragmented integration of stimuli from the environment, the greatest defect centering about the recognition, meaning and impact of the illness itself. The patient states: "The arm isn't mine; it belongs to my dead husband." How is this symbolism arrived at? By virtue of both sensory and motor loss, the arm is experienced as unconnected with the self, external to the self, and incapable of movement. In short, it is experienced as dead. Yet it can be held and manipulated with the right hand, and the range of motion results in sensually tinged contact with the breasts. Death reduces a human being to the status of being a dead object. The dead husband is then equated with the dead arm, linked by the element of sensual contact as well as by the feeling of apartness from her own body. When she touches herself with the paralyzed arm it feels the same as when her husband touched her. Both are dead—both are equal to each other. The tables are turned on fate and a catastrophe becomes a triumph. The rest of the picture then falls into line. The confabulation, denial of illness, the spatial and temporal disorientation follow logically once the arm-husband substitution is made. As the patient is forced to surrender this fantasy by the recovery process itself, the husband fades from the scene but the sexual fantasy is maintained vicariously. An experiential core has filled the gap in much the same way as in the dream. This combination of events—the sudden loss on the one hand, and the experiential replacement on the other—then acts as a deterrent to the reception and integration of environmental influences that might alter or change the experiential adaptation that has occurred.

In this patient, wish fulfillment is not the key to the initial clinical productions. What she says is not based on the wish that her dead husband were there caressing her. This bit of confabulation arises out of her own past experience of lying in close physical proximity to a bodily appendage not an organic part of her own body (her husband's arm). The experience of the stroke is interpreted at a concrete sensational level. What appears subsequently as the continued denial of illness is the result in part of the relative impotence of reality factors to alter the felt explanation experienced by the patient, and in part of an active wish to maintain the status quo. To say that the arm belongs to her dead husband and that the arm is paralyzed is to offer two explanations for the same event. The incorrect—but experientially correct—interpretation dominates the scene. As the patient gets better, the other comes to the fore. The factor of wish fulfillment and the capacity for self-deception are more often features of clear waking consciousness than of altered states of consciousness.

The brain-damaged person is in a less tenable position than the dreamer, or the healthy person in the waking state. He must rely on transparent subterfuges. But these subterfuges exist for the very good reason that he has been the object of a catastrophic experience and has had to account for the

experience in terms of his own personal past, without any reference to the real factors at work. Further, he has had to defend the fruits of his labors (*i.e.*, the confabulated explanation) against an incredulous social environment. The dreamer's task is easier. He does not have to prove that his dream is real. He experiences it in its totality as real. And when awake, he is the first to recognize it as a dream.

In the dream there usually is no given concordant external event about which to structure the symbolism. The elements in the dream generally arise from endogenous sources in connection with affective traces derived from recent experience. A distant rumble not attended to during the day is set in motion; it develops in a setting where it is not perceived clearly or appreciated in a fully conscious manner. Then comes sleep, and a state of relative de-afferentation. What are activated during periods of arousal are felt reactions connected with aspects of past and current experience, never adequately conceptualized, but always relating to perceptual experience of importance to the individual. In the normal course of events in the waking state, the proper relations between internality and externality would be arrived at in the process of transforming sensory experiences into conceptual constructs. In states of altered consciousness, however, this does not occur, as the entire experience is re-experienced without the guiding influence of an afferent stream originating in the external world. The fragmentary percept is developed but remains at a perceptual level and, as such, is experienced in its externality. The various elements are endowed with spatial attributes, as in the case of any other sense data. In both situations, the executive function of the brain is lacking or impaired. What appears in its place is the creation of vicarious internal afferents. At a physiologic level these afferents exert a potentiating influence on the cortical processes taking place. At a subjective level they represent the effort to make an unknown and, in some instance, unknowable occurrence more familiar and known. In the absence of the appropriate explanation, a mythical or confabulated explanation evolves providing an egosyntonic account of events that cannot be accurately conceptualized. The elements entering into the confabulated explanation may be unrelated in spatial and temporal terms, but all are connected in their relevance to the current problem. The reactions at both levels represent the effort to become oriented to a drastically altered internal environment.

In both the brain-damaged patient and the dream, the alterations in the reception and integration of afferent impulses set the stage. The vigilance needs provide the motivation and direction for what ensues. The fragments of life experience related to the current problem provide the costume, the scenery, and the actors themselves. A play is produced that either is successful and gets an ovation loud enough to bring down the house (awakening, in the case of the dream, or loss of the delusional responses, in the brain-damaged), or is unsuccessful, the audience remaining quiescent (continued sleep, in the one case, or continued clouding of consciousness, in the other).

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AKINETIC MUTISM: REVIEW OF THE LITERATURE AND REPORT OF A CASE

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This paper proposes to 1) review the literature on what Cairns *et al.* (8) called "akinetic or trance-like mutism," with the object of demonstrating how varied this remarkable condition can be, both in its clinical features and in the associated symptoms and signs; 2) discuss the nomenclature most appropriate to the condition, the possible site of the lesions producing it, and the ways in which it is produced by them; and 3) report a previously unpublished case of akinetic mutism following an infection of the central nervous system.

REVIEW OF LITERATURE

CLINICAL PICTURE

In 1941 Cairns *et al.* (8) gave the following description of a patient with an epidermoid cyst of the third ventricle:

"The patient sleeps more than normally, but he is easily roused. In the fully developed state he makes no sound and lies inert, except that his eyes regard the observer steadily, or follow the movement of objects, and they may be diverted by sound. Despite his steady gaze, which seems to give promise of speech, the patient is quite mute, or he answers only in whispered monosyllables. Oft-repeated commands may be carried out in a feeble, slow, and incomplete manner, but usually there are no movements of a voluntary character: no restless movements, struggling, or evidence of negativism. Emotional movement also is almost in abeyance. A painful stimulus produces reflex withdrawal of the limb, and, if the stimulation is sustained, slow, feeble voluntary movement of the limbs may occur in an attempt to remove the source of stimulation, but usually without tears, noise, or other manifestations of pain or displeasure. The patient swallows readily, but has to be fed. Food seen may be recognized as such, but there is evidently little appreciation of its taste and other characteristics: objects normally chewed or sucked may be swallowed whole. There is total incontinence of urine and faeces.

"Fluctuations may occur in the intensity of this state. In its incomplete manifestations the patient may respond at times, though slowly and imperfectly, by speech and voluntary movement. Voluntary movement may be accompanied by a coarse tremor of the limbs. Incontinence persists, and there is little or no trace of spontaneous activity or speech. The onset of the condition is gradual. In certain circumstances there may be slow spontaneous recovery; but if the state is caused by pressure of a tumour it may be followed by coma. The condition is sometimes, though not always, associated with decorticate rigidity."

The patient was a 14-year-old girl whose illness had lasted for eight years. It included attacks of headache localized to the region over the left eye, accompanied by paresthesia over the right side of the face, with disturbance of vision and vomiting, lasting for days at a time. The patient was underdeveloped, and there were hydrocephalus and optic atrophy. Associated with her akinetic periods were signs of involvement of the pyramidal tracts, tonic fits, extensor rigidity, and a sluggish menace reflex.

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Over a period of eight months the cyst was aspirated three times; following each of these operations her speech and movements returned nearly to normal in the course of hours or days. There was amnesia for the most akinetic periods.

In 1952 Cairns (7) reported that this was the only case of akinetic mutism he had seen in 18 patients with epidermoid cysts of the third ventricle. He had, however, observed less pronounced cases of akinetic mutism associated with tumors of the pineal body and thalamus, after ventriculography and operation on cases of severe obstructive hydrocephalus, as in stricture of the aqueduct of Sylvius, and in hemorrhage into the dorsomedial thalamic nuclei. A state resembling catatonic stupor was observed after traumatic hemorrhage. He had also seen mutism without akinesis in lesions of the third ventricle.

Reports of similar disturbances of speech and movement have appeared both before and after those quoted above.

TUMORS IN RELATION TO THE THIRD VENTRICLE

In 1936 Grotjahn (15) reported seven patients with tumors in the region of the third ventricle in whom, after ventriculography and, in most cases, subsequent ventricular puncture, the following condition was seen:

"The patients lie motionless, relaxed, and atonic in bed. They never make any spontaneous movement and their usual attitude, which they do not alter of their own accord, resembles a person who lies on his back and rests or sleeps with open eyes. In most cases, and always at the commencement of the akinesia, there is considerable hypotonia of all extremities. The patients make no voluntary movements, and even such automatic movements as blinking of the eyes are slow and rare, and occasionally seem quite absent."

The corneal reflexes were present, but the menace reflex was absent. One of the patients, during episodes of otherwise complete akinesis, had short periods in which he suddenly made complex spontaneous movements, picked his nose or waved flies from his face. Another suddenly began to sing nursery rhymes, in a monotonous voice but with correct melody. A third answered (with a single word) a telephone which was brought to his ear.

The patients remained in the akinetic and mute state for periods ranging from weeks to months, then gradually began to follow movements in their vicinity with their eyes but without interest. They required feeding, although they were able to hold a glass or slice of bread. They swallowed food placed in their mouths.

Consciousness was clear, and there were no disturbances of orientation, memory, or powers of observation. It was always possible to make contact with the patients, although this required much patience. They were able to answer questions adequately, but in monosyllables and apparently with difficulty.

The patients slept day and night, but could easily be wakened. They were incontinent during periods of severe akinesis, but gradually returned to their former habits as it wore off. None was cataleptic or catatonic.

Of the patients' experience during the period of most extensive inhibition, Grotjahn writes that, despite the fact that their ordinary understanding was good, they seemed not quite clear about their condition. When asked about it later, they said they had felt no discomfort; the few answers to direct questioning during the period of pronounced inhibition served to strengthen this impression. Only one patient was euphoric.

In his descriptions, Grotjahn has emphasized those periods during which the seven patients showed greatest disturbance of speech and movement. However, it is possible to see from his case histories that several of his patients did not regain completely normal speech and movement during

the observation period, remaining slow and taciturn.

The seven patients were between seven and 26 years of age, and their histories were of from one to several years' duration. Six had associated hypophyseal growth disturbances. Involvement of the ocular movements was seen in all but one, and all had signs of involvement of one or more of the other cranial nerves. Six were ataxic, and four had generalized hypotonia. All had pronounced internal hydrocephalus, and six had either papilledema or secondary optic atrophy. Autopsy carried out on one patient who died of respiratory paralysis revealed a glioma in the region of the corpora quadrigemina, with closure of the aqueduct and internal hydrocephalus.

In 1956 Mason-Browne (22) described a case of epidermoid cyst in a 41-year-old woman who had been ill for 18 months. After partial removal of the cyst she developed a condition which "bore a striking resemblance to the syndrome entitled akinetic mutism by Cairns *et al.*"

The clinical picture was characterized by epileptic seizures, personality changes, memory disturbances, incontinence, right-sided hemianopsia and right-sided hemiplegia. A grasp reflex and catatonia were present. Of particular interest is the fact that, as the first symptom of her illness, she showed "trance-like states . . . episodes during which the patient would, in the midst of household activities, suddenly become inert and unresponsive and as suddenly, about ten minutes later, would resume where she had left off."

The patient died of pneumonia six months after operation. Autopsy revealed an epidermoid tumor at the base of the brain and extending up into the third ventricle and hypothalamus. The greater part of the third ventricle was obliterated by the tumor, which posteriorly was in relation to the mesencephalon and pons. The optic tracts were involved behind the chiasma, where the tumor also affected the left internal capsule. The cortex and the rest of the brain were normal. There was no distention of the lateral ventricular system.

In 1958 Daly and Love (10) reported a 14-year-old boy who, at operation, was found to have an astrocytoma which filled the upper part of the fourth ventricle and extended around the lower end of the aqueduct. This upper part of the tumor could not be removed. The ventricular system cephalic to the tumor was greatly dilated.

After operation the patient developed a condition in which his speech and movements were inhibited, although he could understand what happened around him and what was said to him. He began to speak 34 days after operation, at first using only monosyllabic words or short sentences. His movements became gradually less inhibited during the latter part of the two-month observation period.

In the postoperative period he developed ocular muscle palsies and cerebellar signs, which improved gradually. He had amnesia for the entire period (37 days) from the day after his operation until the third day after he began to speak.

In 1959 Lavy (19) described a case of craniopharyngioma in a 33-year-old man. The disturbances included disorientation, increased sleepiness, and excessive eating and drinking. The only abnormal physical signs were absence of abdominal and cremasteric reflexes. A few weeks after admission the patient became incontinent, appeared to lose interest in his surroundings, and showed only a very slow and feeble (but adequate) response to painful stimuli, without change of attitude or expression.

Air encephalography and the subsequent operation revealed that the tumor lay in relation to the third ventricle. The lateral ventricles were dilated. After operation (during which the tumor was partially excised), the inhibition of movement and speech became gradually more pronounced, but over the course of six months his condition slowly improved, only to deteriorate

gain to such an extent that he was almost ompletely inhibited.

OLITARY METASTASIS IN THE MIDLINE OF THE MIDBRAIN

In 1954 Williams (36) described a patient vho showed confusion, and eye signs sug- estive of a small lesion in the midbrain. The patient was admitted in "a state of tupor," an expression the author uses as a ynonym for akinetic mutism. (See discus- ion on nomenclature.) The patient was ompletely immobile and did not respond o painful stimuli, but was able to answer questions relevantly. There were no demon- strable sensory changes, and voluntary movements were normal. After several weeks during which the condition remained unchanged the patient died. Autopsy re- vealed a metastasis in the midline of the midbrain from a primary carcinoma of the lung. There were no other deposits in the brain, nor was there hydrocephalus.

ANGIOMA IN THE MIDBRAIN AND REGION OF THE THIRD VENTRICLE

In 1932 Hechst (16) reported a case of cavernous hemangioma localized to the up- per part of the brain stem in a 44-year-old actor. For approximately one month pre- ceding his first admission he had com- plained of headache, sleepiness and diplo- pia. On admission there was paralysis of vertical movement of the eyes, the pupils did not react to light, and seroreactions were positive for syphilis in both blood and cere- brospinal fluid. (There was a history of a luetic infection 19 years earlier.) The pa- tient had a strong tendency to fall asleep, but was easily wakened. After salvarsan treatment the sleepiness disappeared.

On the patient's second admission, three months later, examination revealed that he also had short periods of immobility. There were gradually increasing somnolence and akinesis, with incontinence and loss of in- terest. Speech consisted of monosyllabic re- plies to questions, the replies coming more and more slowly as questioning continued. The patient was coherent and, to some ex- tent, aware of his disability. He later ex- plained that he knew the answers to the questions but could not say them aloud. There was one short episode of catatonia of one arm.

The patient became gradually more aki- netic and, for the last three months of his life, lay almost without moving, although he would look at the doctor. He died of bronchopneumonia one year after the be- ginning of his illness.

Autopsy revealed a cavernous heman- gioma involving the posterior medial por- tions of both thalami. Posteriorly it in- volved the anterior part of the superior corpora quadrigemina, and appeared to press on the oculomotor nuclei. In both places there were signs of small hemor- rhages. The central grey matter around the aqueduct was also affected. The third and lateral ventricles were greatly dilated, but the rest of the brain, including the cerebral hemispheres, was normal. There was no evi- dence of syphilitic infection.

In 1933 Linde (21) described a cavernous hemangioma in a 27-year-old woman who for two or three years had had increasing difficulty in working, memory disturbance, depression and sleepiness. There were also headache, vertigo, diplopia, and paresthesia involving the entire body. In addition, the patient was irritable and in low spirits, and at first she was thought to be suffering from a hebephrenic psychosis. In the year pre- ceding her admission to hospital she had had difficulty in speaking, incontinence, polydipsia and somnolence.

The patient's voice was monotonous and her face expressionless. She answered ques- tions reasonably accurately but only after a long latent period. She was slightly con- fused and disoriented, and her movements were few and slow. Further examination revealed protrusion of the eyes, reduction of the visual fields, left-sided facial paral- ysis, reduced mobility of the tongue, dys-

arthria, increase of the deep reflexes, left-sided extensor plantar response, tremor, uncertain gait, and generalized hyperesthesia.

There was a gradual increase in the brain stem symptoms, and the patient died five months after admission.

Autopsy revealed a cavernous hemangioma, about the size of a walnut, extending from the base of the pituitary stalk upward in the midline of the roof of the right lateral ventricle. The third ventricle was filled with and infiltrated by angiomatous tissue. The basal ganglia, thalamic regions and both internal capsules were compressed, and posteriorly the tumor reached the substantia nigra. The cerebral peduncles were invaded to a slight extent by two predominantly hemorrhagic-cystic projections from the angioma. The lateral ventricles were considered to be only slightly dilated.

In 1957 Riser and his colleagues (28) reported angioma of the midbrain in a 58-year-old woman with a six-month history of severe headache, depression, sleeplessness, and a weight loss of 10 Kg. On admission she showed no spontaneous movement or facial expression, and after repeated requests would say only a few words. She was slightly confused and disoriented. Painful stimuli produced a weak protective reaction but no change in expression. There were nystagmus and reduction of the tendon reflexes.

The patient became increasingly comatose, and died in hyperthermia one week after admission. Autopsy revealed a recent hemorrhage in the region of the cerebral aqueduct. The same area contained enlarged capillaries, considered to be of angiomatous origin. The remainder of the brain and ventricular system was normal.

In 1961 Steriade *et al.* (33) described akinetic mutism in a 13-year-old boy thought to have a vascular malformation in the brain stem, with hemorrhage. After the acute episode the patient lay immobile for several months, making complex movements only when subjected to severe pain. After a latent period of many seconds he was able to lift one, two or three fingers of his right hand in response to questions. In this way it was possible to ascertain that he was fully oriented as to time and space and able to do arithmetic. He could understand that he was ill, but apparently had no idea of the severity of his condition.

Early in the course of the disorder the patient could chew and swallow food placed in his mouth. Sleep was normal. There were sphincter disturbances, and both menace and acousticopalpebral reflexes were absent.

The patient began to speak after seven months, at first using only monosyllabic words. Five months after the beginning of his illness he developed symptoms of a psychosis, including catatonia. (The authors considered this to be schizophrenia.) His face remained expressionless throughout his illness until suddenly, after he had been ill for ten months, his expression and the rest of his behavior became normal in the course of a few days. He had amnesia for the first part of his stay in hospital (a period of 11 months), but could remember some events from the latter part, especially the last few months.

In addition to the evidence of subarachnoid bleeding and raised intracranial pressure early in the illness, there were also cranial nerve palsies, left-sided hemiparesis, cerebellar ataxia, hypotonia of the legs, spasticity of the left arm, extensor plantar responses, grasp reflex and organic tremor. Fifteen months after the beginning of his illness the patient was still ataxic but could walk. He had diplopia due to right abducens paresis, and dysarthria, but his expression was normal and intelligent.

ISCHEMIA IN THE AREA OF SUPPLY OF THE BASILAR ARTERY

In 1958 Fog (12) described a 44-year-old man with a three-year history of transient brain stem attacks. One had been followed by unconsciousness; two days later the pa-

t ent was observed to be akinetic and mute, l ut apparently conscious and able to follow (vents with his eyes. There were generalized l ypotonia and extensor plantar responses, : nd the patient turned his head to the right ı ost of the time. Death occurred a fortnight : fter his "stroke." Autopsy revealed a re- (ent partial thrombosis of the basilar artery, ' hich was atherosclerotic, and softening of the dorsal half of the pons.

In 1958 Williams (37) described an elderly man with basilar artery occlusion who presented with complete akinesis and mutism but was later able to recall events which had occurred while he was in that state, and also his own inability to move or speak. The author commented that, in his experience, such recollection was uncommon.

In 1960 Cravioto *et al.* (9) described eight patients, ranging in age from 54 to 70 years, seven with thromboses in the basilar artery or its branches, the eighth suffering from carbon monoxide poisoning. All were mute and immobile except for movements of the eyes (which would follow the observer), blinking, and occasional movements of the limbs in response to painful stimuli.

All of the seven patients with basilar artery thrombosis were extremely ill, all had symptoms and signs of involvement of several cranial nerves, together with paresis of the limbs, and all died. Autopsy revealed lesions of the brain stem in all, and in some there were also lesions in various parts of the cerebrum. In the eighth case, lesions were found bilaterally in the globus pallidus and in the left frontal gyrus.

WERNICKE'S ENCEPHALOPATHY

In 1953 Nielsen (25) described a case of Wernicke's encephalopathy in a 70-year-old man. The patient had eye muscle paresis, diminished to absent tendon reflexes, and bilateral flexor plantar responses. He was conscious but did not respond to stimuli. He would eat food placed in his mouth but would not feed himself. Laboratory investigation revealed evidence of diabetes and renal failure.

After three days of intensive treatment the patient was able to answer questions with relevant monosyllables, although he continued to stare straight ahead. He died on the fourth day after admission. Autopsy revealed a posterior cardiac infarct and pneumonia. There were hemorrhages in both thalami and in the columns of the fornices. The left cerebral peduncle, including the red nucleus, was hemorrhagic, as were the tegmentum of the mesencephalon at the level of the inferior colliculi, the left inferior colliculus, and the mammillary bodies. Small ependymal hemorrhages were seen in the pons.

ENCEPHALITIS

In 1936 Stern wrote (34) that some cases of epidemic encephalitis (Economo's disease) showed a state of immobility, with open eyes and retention of consciousness. These periods may follow hyperkinetic episodes, but may also occur alone. There may be little insight in these conditions.

In 1953 Foley and Williams (13) described inhibition of speech and movement associated with inclusion body encephalitis. The inhibition occurred in the middle stage of the disease and was associated with extrapyramidal features and complex involuntary movements which showed a striking periodicity.

TRAUMATIC LESIONS

In 1948 Goldstein (14) described two symptom complexes developing after bullet wounds of the frontal lobes.

In one the patients lay motionless and without speaking. They were doubly incontinent. They reacted to demands and answered questions in such manner that the author felt that memory and mental functions were not greatly disturbed. This condition usually lasted for several weeks.

In the other, periods of immobility alternated with periods of restlessness and com-

pulsive movements, and some patients also showed slowness of reaction, catalepsy and mutism. Those who remitted had a permanent mental defect.

As was mentioned earlier, Cairns (7) reported having observed akinetic mutism following traumatic hemorrhage in the upper brain stem and diencephalon.

CASES WITHOUT CONFIRMED ETIOLOGY

In 1951 Williams and Parsons-Smith (38) described two patients with disturbances of speech and movement similar to those described here.

The first was a 39-year-old man with a six-month history of lack of energy and a one-week history of severe recurrent right-sided headache. The day before admission he had had four generalized convulsions. His condition on admission was described as follows: "When first seen he was lying motionless and immaculate as he had been arranged by the nurse. The bedclothes were being disturbed by quiet breathing, and his expressionless face by an occasional blink."

He was completely immobile, and unresponsive to speech, noise and slight pinprick; to more painful stimulation, he responded by attempting to remove the source of the irritation. Examination revealed unreactive pupils, generalized hypotonia, with equal and sluggish reflexes, hypertension, pleocytosis and leukocytosis.

There were further convulsions and incontinence, but then the patient improved and, after five months, was able to return to work.

Six months later the patient had three generalized convulsions and was re-admitted. For the next four weeks his condition varied from states of complete mutism and akinesis except for eye movements, to more normal states, in which he could move spontaneously and in response to command, and could answer questions. He seemed to be disoriented as to time and space, and to have amnesia for recent events, dysphasia and dyspraxia. The change from one state to the other could be extremely rapid. There was no evidence of catatonia.

Abnormal physical signs were limited to residual hemianopsia, defect of upward deviation of the eyes, and sluggish tendon reflexes. There was laboratory evidence of diabetes. Ventriculography revealed slight, symmetric dilatation of the lateral ventricles.

In the course of about two months the patient's condition improved, and on discharge his spontaneous activity and speech were considered to be normal.

The cerebrospinal fluid and electroencephalographic findings seemed to indicate that the case was one of virus encephalitis affecting the brain stem.

The condition of the second patient, a five-year-old girl, closely resembled that of the first except that there were more abnormal neurologic signs and symptoms, and there was also evidence of upper respiratory tract infection.

Hermann, Klee and Tottey (17) in a future article will describe a 23-year-old woman with two-year history of increasing difficulty in managing her work as a child nurse. Attacks of migrainoid headache occurred weekly to monthly. She became increasingly sleepy and tired, had difficulty in reading, and her memory became slightly impaired.

During the first months after admission the patient sat very still, with little facial expression, only her eyes moving freely. She did not speak spontaneously, and answered questions with monosyllables or short sentences. After from five to ten minutes of conversation, the latent time before she answered was as great as two minutes. Although during these latent periods she was almost motionless, she could indicate by *Yes* and *No* that she had understood what had been said. She later said that "the words were there, but they didn't come," but did not seem to realize how slow her reactions had been. Her spontaneous movements were less restricted than her voluntary ones,

which often consisted of several stages. There was an increased latent period in her reaction to pinprick, but when she did remove the insulted limb she did it normally. She did not react to sudden unexpected sounds, and the menace reflex was absent. Her state could alter very rapidly—for example, during one interview she became for some minutes nearly normal in speech, movement and expression.

During this period other neurologic findings were: bilateral reduction of power in the facial musculature, glabellar-tap phenomenon, and absence of the gag and right patellar reflexes. Cerebrospinal fluid contained 27 cells per mm^3, and 54 mg. protein per 100 ml. Air encephalography and vertebral angiography were normal.

The patient's condition gradually improved over the course of several months.

Psychologic testing at the beginning of hospitalization showed clear disorientation in space, slight finger agnosia, dyscalculia, and slight reduction of memory and learning power. About two months after admission the space disorientation disappeared from one day to the next. In the latter part of the patient's illness the signs of dementia increased as her anomalies of speech and movement improved. A characteristic of her psychologic test results was their marked variability.

Eight months after admission the anomalies of speech and movement were still present but in a very much decreased degree, and there were no longer any subjective disturbances.

The cause of the symptoms and signs was not discovered.

TRANCELIKE ATTACKS OCCURRING IN NARCOLEPTICS

It is well known that patients with narcolepsy can suffer from attacks during which they are able to hear what is said and can understand what is happening around them, but cannot move (**39**, p. 1682). Sometimes there is loss of muscle tone, but this is by no means invariable. The attacks are often of emotional origin, as, for example, the one described by Wilson in 1955 (**39**, p. 1683): "A dramatic illustration is afforded by the case of a narcoleptic who was thrilled to see an old friend he had not met for years approaching him on the pavement, but just as he was on the point of stepping forward to greet him, the excitement of the moment rendered him speechless and paralysed, unable to stir a foot: the friend passed unheeding, to be lost in the crowd."

SCHIZOPHRENIA, DEPRESSION, MANIA AND HYSTERIA

Akinetic mutism occurs most frequently in association with these disorders. As Williams (**36**) stated, it is "well known to the psychiatrist but ignored by others."

That there is a similar type of disturbance in diseases both of established organic and of psychiatric origin is implied by Arieti (**2**), who points out that the catatonic type of stupor "may at times be confused with . . . akinetic mutism" (of organic origin).

In 1959 Smith (**32**) published a survey of 27 psychiatric patients who showed "both immobility and mutism with no sleepiness or loss of consciousness." There were no other abnormal neurologic signs. Smith stated that "in psychiatric practice, depressive and catatonic stupor [he used the word *stupor* as a synonym for akinetic mutism] are by far the most common." Further, he felt that the disturbances of movement and speech were the same in psychiatric cases and in those of proved organic origin. This paper also contains a survey of the psychiatric literature.

DISCUSSION

All of the disturbances of speech and movement emphasized in this review appear to be variations of the same basic disorder: an inhibition of motor function comprising speech, movement and facial expression, but with preservation of sensory functions and awareness.

VARIATIONS IN THE CLINICAL PICTURE

Inhibition ranges in degree from almost total to so slight as to give an impression of merely hampering (8, 15, 38).

In the severely inhibited states the appearance and movements of the eyes are often the only indication that the patient is aware of his surroundings (8, 9, 12, 15, 16, 22, 38). If he answers questions he does so after a long latent time, and with monosyllables or short sentences and in a monotonous voice (8, 15–17, 21). Movements show a similar prolongation of the latent period (17, 33): they are often slow, and sometimes are carried out in several phases (16, 17). The spontaneous activity may be less hampered than the voluntary (15, 17).

Frequency of blinking may be reduced and the menace reflex absent in the almost completely inhibited (15, 33) and in the partially inhibited (17) states.

Variation in the degree of inhibition can occur from one minute to the next (15–17, 22, 38, 39). Duration of inhibition can be from minutes (16, 22, 39) to months (8, 15–17, 33, 38).

The disease causing the inhibition obviously determines which neurologic signs and symptoms occur in association with the disturbance of motor function. Cases may vary from those with very few obvious symptoms and signs (17, 39) to those with paresis, visual disturbances, disorientation, hypersomnia, coma, hormonal disturbances and epileptic phenomena. Catatonia (7, 16, 22, 33) and personality changes (21, 22, 33) may be associated symptoms.

When other neurologic symptoms and signs occur simultaneously they limit the appearance of the disturbances of speech and movement emphasized in this paper, so that the characteristic inhibition of motor function is obscured, sometimes markedly (9, 22).

Some of the patients described had amnesia for the periods of pronounced inhibition (8, 10), but those of Grotjahn (15) and Steriade *et al.* (33) could remember much of the period, and Williams (37) described a patient who could clearly remember what had occurred.

Mayer-Gross *et al.* (23) stated that schizophrenic patients were often amnesic for the catatonic-stupor state.

Several patients' experiences of the pronounced inhibition have been described (15, 17, 33, 34). Despite their awareness of their surroundings, they seemed to be to some extent unaware of how inhibited they actually were. Two papers (16, 17) give the patients' replies to direct questions as to why they took so long to answer; both stated that they knew the answers, that the words were there but just could not be said aloud.

NOMENCLATURE

The inhibition of motor function described here is often considered to be a disturbance of consciousness (7, 9, 12, 22, 27, 28). During the periods of inhibition, however, the patients are aware of their surroundings and may remember what happened.

Presumably the chief reason for describing this disorder as a disturbance of consciousness is the frequent appearance of hypersomnia and coma as associated symptoms. Cairns himself (7) pointed out that, in lesions of the midbrain, diencephalon and third ventricle, the following conditions may develop: "1) coma with decerebrate rigidity; 2) hypersomnia; 3) akinetic mutism; 4) coma with hyperthermia. The forms are distinct, but one may pass into another . . ."

The most logical term for the disturbance of speech and movement discussed here would be *akinesis* or *hypokinesis*, since there does not, in principle, appear to be any difference between the disturbance of movement and that of speech. Grotjahn in 1936 (15) used the expression "*akinetischer Zustände*" (akinetic conditions), and Boes-

roem in 1936 (6) called them "*echte Akinesie*" (true akinesis). In 1957, under the general heading of "Disorders of Motor Actions at a Higher Level," Klein and Mayer-Gross (18) described "lack of motor impulses" as akinesis.

As Williams and Parsons-Smith pointed out in 1951 (38), however, the terms *akinesis* and *hypokinesis* are used in the description of Parkinsonism, and since they are also used in the description of other disorders they are not sufficiently specific to describe the condition under discussion.

In 1932 Hechst (16) called the disturbance "*katatone Bewegungsstörungen*" (catatonic disturbances of movement), because it may occur in patients with schizophrenia. But this expression is also inappropriate, in that the disturbances of speech and movement occur in other diseases as well.

Some authors use the word *stupor* (31, 32, 36, 38). Again this is an inappropriate term, in that it is not sufficiently specific; it is used for conditions in which the patient is in coma or semicoma (20, 35), whereas the most important feature of the disturbance described here is the patients' awareness of their surroundings.

As was mentioned at the beginning of this paper, Cairns *et al.* (8) introduced the term "*akinetic or trance-like mutism*." Since then many authors have used the abbreviated form of this expression—"*akinetic mutism*" (2, 9, 10, 12, 13, 17, 19, 22, 27, 33, 37, 39). It is therefore suggested that it be used for all the variations of inhibition of motor function mentioned, despite the fact that it rather unduly emphasizes one aspect, the inhibition of speech.

(Denny-Brown (11) used the expression "akinetic mute state" to describe a condition very different from that under discussion, one occurring in patients with severe destruction of the globus pallidus. These patients are immobile in a position of general flexion of the limbs, with pronated wrists and extended fingers.)

CORRELATION BETWEEN CLINICAL AND PATHOLOGIC ASPECTS

In cases where other neurologic symptoms and signs have been described (7, 8–10, 12, 19, 21, 22, 25, 33, 36–38), the localizations of the lesions, as indicated by them, appear to have in common the area including the mesencephalon and the region around the third ventricle. Air encephalographic findings as well as findings at operation (8, 10, 15, 19) point to the same regions.

In most of the cases coming to autopsy (9, 12, 13, 15, 16, 21, 22, 25, 28, 36), the lesions have been described as being located in these regions. In two, however (9 Case 2, 12), the only lesions found were in the pons. In one case the only lesion found in the brain was a small metastasis in the midline of the midbrain (36); in another, the only lesion was in the region around the aqueduct (28).

In the two cases reported by Williams and Parsons-Smith (38), investigations using thalamic electrographs indicated that the lesions were apparently localized in the ascending reticular system.

In 1959 Adametz and O'Leary (1) reviewed the experimental literature on akinetic mutism. They felt that lesions in the periaqueductal grey substance of cats could give rise to mutism, but not to akinesis and mutism. Other investigators (3–5, 29), however, have produced akinesis and mutism in cats and monkeys by lesions in the periaqueductal grey matter. It is relevant to mention here Cairns's (7) observation that mutism without akinesis can occur in third ventricular lesions in man.

Adametz and O'Leary gave no explanation for these differing experimental findings, but it could well be a matter of the extent and exact site of the lesion.

The lesion which produces the actual disturbances is presumably of limited size. In any event, akinetic mutism can occur in man in the presence of normal vertebral arteriog-

raphy (17) and normal air encephalography (17, 38). The inhibition can be provoked by ventriculography and ventricular puncture in patients with tumors related to the third ventricle (15), and these measures presumably do not damage the brain to any great extent. Puncture of an epidermoid cyst localized in the third ventricle (8) can cause the inhibition to regress.

HOW AKINETIC MUTISM MAY ARISE

As described, patients with akinetic mutism have retention of sensory functions as well as retained awareness. They are also able to move and speak if the inhibition of motor function is overcome or disappears.

These facts indicate that the long motor and sensory pathways are relatively intact, and this suggestion is supported by the autopsy findings described previously. Also, it would be difficult to explain the marked changes in the degree of motor inhibition as caused by lesions of these pathways.

In 1954 Penfield and Jasper (27) described "the centrencephalic system," which is localized in the upper brain stem, the area in which, as is apparent from the cases described here, lesions may cause inhibition of motor function. They defined this system as "that neurone system centering in the higher brain-stem which has been up to the present, or may be in the future, shown to have equal functional relationships with the two cerebral hemispheres. It forms the chief central integrating mechanism for various areas of cortex."

In his Sherrington Lecture in 1958, Penfield (26) stated: "Coordination and integration within the centrencephalic system of the diencephalon, midbrain and pons (higher brain stem) provides the physical basis for what Hughlings Jackson called the highest level of functional representation."

Although Penfield and Jasper (27) and Penfield (26) did not discuss akinetic mutism in detail, they obviously considered akinetic mutism to be caused by an "isolated paralysis of the centrencephalic system."

On this theoretical basis, patients with akinetic mutism can be understood to be inhibited in their cortical motor functions, even though the lesions are localized to the area around the upper brain stem and the cerebral cortex is not directly involved.

The occurrence of akinetic mutism in patients with psychiatric disorders may also be explained in the manner suggested by Penfield and Jasper (27). How this may happen is not known, but it is known that persons can become mute and paralyzed by strong emotional stimuli, and akinetic mutism has been so produced in patients with narcolepsy (39).

The patient reported by Steriade *et al.* (33) developed, in addition to akinetic mutism, a schizophrenic disorder presumably caused by the same organic lesion.

CASE REPORT

The patient, daughter of a farmer, was born in 1939, the third of four siblings. Delivery was normal. There was no family history of nervous or mental disorders. Her motor and mental development had been entirely normal until the onset of the present complaint, and she had been healthy except for uncomplicated measles, pertussis and rubella.

Seven months before admission, when the patient was five and one-half years old, several members of the family suffered from a pyrexial illness diagnosed as "influenza." At this time the patient became ill with fever, followed one day later by repeated vomiting and, after a further 36 hours, by two or three generalized convulsions daily, preceded by a vague aura—"Something came up inside me and made me feel so sad." These convulsions recurred for four days, after which the patient apparently recovered completely. However, there were five subsequent recurrences of the fever,

vomiting and convulsions, occurring one, two, three, six and seven months after the first.

During the last of these attacks the patient was admitted to a local hospital (Department of Medicine, Herning Hospital) in a state of acidosis following repeated vomiting. She had frequent tonic convulsions, and became increasingly unresponsive and hypotonic. Laboratory investigations revealed the presence of ketone bodies in the urine. There were mild acidemia and hypochloremia. Blood sugar was normal. Cerebrospinal fluid contained a normal number of cells and normal protein. A diagnosis of acetonic vomiting was considered but, since the patient's condition was thought to be too severe to be due to this alone, she was transferred to the Department of Neurology, University of Århus, for further investigation.

Examination on admission revealed a thin, dehydrated child in poor general condition. She lay quite motionless except for her eyes, which moved to follow objects in her surroundings (Figure 1). She did not speak or respond to commands. Her reaction to painful stimuli was sluggish. No cranial nerve palsies were observed, and the blink reflex was present. The tonus of trunk and limbs was markedly reduced (Figure 2) and the deep reflexes were sluggish. Plantar responses were normal. Ophthalmoscopic examination revealed an insignificant difference in pupillary size; the reaction to light was normal, as were the fundi and the movements of the eyes, with the exception of upward rotation. The patient could not fixate close objects.

Supplementary studies gave no evidence of a space-occupying lesion. X-ray of the skull was normal. Repeated examination of the cerebrospinal fluid gave normal values for protein and cells. Fasting blood sugar, 77 mg. per 100 ml.; fasting spinal sugar, 57 mg. per 100 ml. Percentile quotient, 74 (normal range, 50–70 (24)). Two electroencephalograms were considered to be within normal limits for the patient's age. The blood picture was normal on several occasions; in particular, there was no leukocytosis. X-ray of the chest was normal.

The patient remained in a state of almost complete immobility for several weeks. She would smile occasionally but did not speak. She did not give the impression of being in pain, and there were no signs of meningism. She had to be fed, and would take only fluids. She did not indicate her excretory needs, but would micturate when placed on a bedpan.

STUDIES AND FURTHER OBSERVATIONS

The patient would blink when her cornea was touched, but showed no fear reaction. She did not blink on having a pen brought to within 2 mm. of her eye. Her immobility seemed aggravated when she felt under observation, or when invited to move, but on some occasions she would move spontaneously when she thought herself alone. When offered an apple she would remain motionless, and if it was placed in her hand she would let it fall, but would open her mouth to be fed and to have her teeth brushed. When left alone she would chew, and would

FIG. 1. Patient at time of hospital admission. (See text.)

A

B

FIG. 2: A and B. Illustrations of reduced tonus of trunk and limbs.

even remove a bedpan after use, but never in the presence of others. Although she uttered no words she would occasionally laugh aloud, and now and then would groan. She never sobbed or cried spontaneously. When her response to strong galvanic stimulation was tested, however, she finally began to cry. Apart from this, she remained motionless, making no attempt to escape or even to withdraw the stimulated limb, despite visible lightening contractions of the muscles. After this procedure her tendon reflexes were noticeably easier to elicit.

COURSE

The patient was temporarily transferred to the Pediatric Department so that her response to the presence of other children could be observed. There was, however, no immediate alteration in her behavior. The contrast between her watchful glance and motionless attitude was as marked in the presence of her contemporaries as it had been in the adult ward. After she had thought herself unwatched, she might be found to have lifted her leg onto the bedcover, or picked up a doll. Gradually a slow improvement was noticeable: she would smile at the other children, and might take a candy which had been placed on her bedtable; this would not happen immediately, but only after an interval of several minutes, when the nurse had left the room.

During the fourth week of her admission the patient had a recurrence of the vomiting, but the following week she sat up in bed, and from that time on her improvement was rapid. The hypotonia decreased and spontaneous movement returned, accompanied by a slight tremor. By the seventh week after admission she was able to walk alone, but still did not speak.

RELAPSE

A short relapse with vomiting was followed by a persistent slight elevation of her temperature, which lasted for some weeks.

During this period the sedimentation rate, which had been normal on admission, increased to 79 mm./hr., and her blood pressure (90/60 on admission) rose to 125/100 mm. Hg. There was still no evidence of raised intracranial pressure, and the electroencephalogram remained normal. The patient's immobility did not return to its former severity, but her reactions were characterized by long latent periods. She appeared to understand the commands given. Her gait was slightly ataxic, and there was some residual hypotonia.

The patient was thought to be suffering from an organic brain disorder, but the possibility of a hysterical overlay was also considered. This, however, was not supported by investigation into her pre-morbid personality and family background. Seemingly she had always been a bright, good-natured and well-balanced child, with no evidence of behavior disturbances. During her mother's visits to the hospital she behaved in the same manner as in the presence of others, but her more attentive expression seemed to indicate that she followed with interest the news from her home.

She was discharged from hospital three and one-half months after admission.

SUBSEQUENT PROGRESS

Four months after discharge the mother reported further improvement in her child's general motor activity, although it had not yet returned to its previous state. She remained mute for two months; thereafter her speech gradually returned, "as if she was learning to talk all over again." She reacted happily and excitedly when she said her first words, and went on to practice speech eagerly. At first she used a loud voice and scanning speech, talking very slowly. She gradually recollected events from before her illness, but appeared to have amnesia for the first weeks thereof.

In December, 1960 (14 years after the acute episode), in answer to a written questionnaire, her mother said that about two years after discharge there had been a further episode of anorexia and vomiting, unaccompanied by pyrexia or convulsions. Apart from this there had been no isolated episodes, but she had frequent respiratory tract infections and pyelocystitis, as well as occasional general malaise and vomiting. There was some residual tremor of the hands (Figure 3), especially after hard work, but she was able to do needlework. Her speech was not entirely clear. She was nervous and

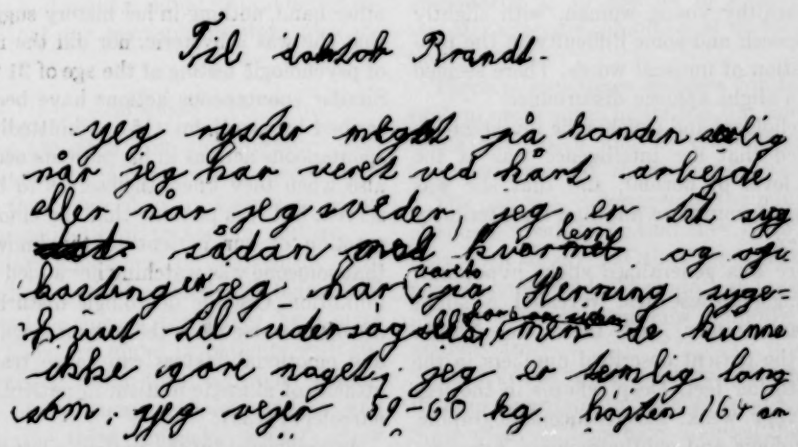

FIG. 3. Sample of script (14 years after acute episode), illustrating residual tremor in handwriting.

uncertain in unaccustomed situations, had few friends, and seemed to prefer to be alone. She appeared to have a considerable vocational handicap: within two years she had changed her position as an unqualified rural home-help three times. She was, however, able to help her parents on the farm.

With her mother's reply the patient enclosed a letter which she concluded by referring—quite uninvited, as far as the questionnaire was concerned—to the strong galvanic current which had been used in an attempt to stimulate motor activity: "The only things that I remember from my time in the hospital in Århus were that blood was taken for tests, and that you used a machine that pricked and tickled to make me talk."

FOLLOW-UP STUDY

In February, 1961, 15 years after her first stay in hospital, the patient was readmitted to the Department of Neurology, University of Århus, for a follow-up study. She added to the information contained in the written questionnaire the fact that she had occasional fainting attacks, which occurred only when she was standing—if she could lie down in time she did not faint, but felt nauseated and dizzy.

On examination the patient appeared to be a healthy young woman, with slightly slow speech and some difficulty in the pronunciation of unusual words. There seemed to be a slight aphasic disturbance.

Psychologic and psychiatric investigation revealed that her intelligence was at the lower level of normal, and that she was somewhat immature and had an inferiority complex.

There was generalized slight hypotonia; the finger-to-nose test revealed a slight terminal tremor, and there was ataxia when the patient described numbers in the air with her feet. Deep reflexes in the legs were very weak. Electroencephalographic, neurotologic and ophthalmologic investigations were normal. Erythrocyte sedimentation rate, 7 mm./hr. Blood pressure, 110/80 mm. Hg. Routine blood examinations and electrocardiogram were normal. Lumbar puncture, 30 mg. protein per 100 ml., 6 cells per mm^3. Adrenalin-liquor saccharum reaction (ALSR) (24), 0.013. (This is considered to be an abnormally low value.)

SUMMARY OF CASE REPORT

A girl, now 21 years of age, at the age of five and one-half had suffered from recurrent episodes of convulsions, vomiting and fever. The illness had begun during an "influenza" epidemic. She subsequently developed a state of akinetic mutism which lasted for several weeks and disappeared gradually. Residual defects included slight mental impairment and slight difficulty in speaking.

COMMENT

The condition of muteness and almost complete immobility which in this patient lasted for several weeks, the only constant sign of consciousness being in the expression and movement of her eyes, is characteristic of akinetic mutism. Her occasional complex spontaneous actions, especially when she thought herself unobserved, could indicate the presence of a hysterical reaction; on the other hand, nothing in her history suggested that she was a hysteric, nor did the results of psychologic testing at the age of 21 years. Similar spontaneous actions have been described by Grotjahn (15). Admittedly, the spontaneous actions in his patients occurred also when they knew themselves to be observed, but it is possible that the emotional reaction of our patient to the knowledge that someone was watching her added to her inhibition. Organic neurologic disturbances are often worse when the patient is watched, and emotional factors can cause transient attacks of akinetic mutism in patients with narcolepsy (39).

As evidenced by the patient's letter, amnesia was not total, even for the periods when the akinetic mutism was most severe.

During this period there was loss of the menace reflex; later in the course of the disease, following a relapse with fever and vomiting, for a period of weeks there was an increased latent period for voluntary movements.

Strikingly, the patient did not speak until some two months after her movements had begun to return to normal. That to some extent she felt she must learn to speak from the beginning again suggests that there was also an aphasic disturbance.

The patient did not recover completely. Fifteen years after her first admission there were slight generalized hypotonia, ataxia, organic tremor of the hands, problems with the pronunciation of difficult words, and signs of slight mental impairment.

The attacks of fever and vomiting, the raised sedimentation rate, together with the abnormal glucose percentile range (and the low ALSR found at follow-up examination (24)), and the neurologic signs, suggest an infectious process in the central nervous system. The etiology of this encephalitis remains unknown, but the simultaneous epidemic of "influenza" among the other members of the family suggests a viral infection. Hypotonia, slight impairment of ocular movement, ataxia and akinetic mutism indicate involvement of the brain stem; the aphasia and slight residual mental defect indicate that the hemispheres were also involved.

SUMMARY

Cases are cited from the literature with disturbances of movement and speech similar to those described by Cairns *et al.* in 1941 as akinetic or trancelike mutism.

Similar anomalies of movement and speech have been described both before and since publication of the paper by Cairns *et al.* They are found in patients with tumors related to the third ventricle, hemangioma of the mesencephalon and in and around the third ventricle, basilar artery thrombosis, Wernicke's encephalopathy, encephalitis, bullet wounds through the frontal lobes, and narcolepsy; and also in patients with various psychiatric disorders: schizophrenia, mania, depression and hysteria. A few cases have been described where the etiology could not be verified.

These case histories seem to indicate that all of the disturbances of speech and movement mentioned are variations of the same basic disorder: an inhibition of motor function, comprising speech, movement and facial expression, but with preservation of sensory functions and awareness.

Variations occur: the patient may be almost totally immobile and mute, or may have only a suggestion of hampering of speech and movement. In the most inhibited states, the appearance and movements of the eyes may be the only indication that the patient is conscious. If he speaks, it is often only after a long latent period, and then with monosyllabic words or short sentences, in a monotonous voice. Movements are slow, and may show a similar long latent period; the spontaneous activity may be less hampered than the voluntary.

Variations in the degree of inhibition may occur from one minute to the next, and the inhibition may last for minutes or months.

The associated neurologic symptoms also show great variety, and are sometimes so pronounced as to obscure to some extent the characteristic inhibition of motor function.

There is sometimes amnesia for the periods of pronounced inhibition, but some patients have been able to remember what happened even at these times.

The patients' experience of the inhibition of speech seems to be that they know what they wish to say but that the words cannot be said aloud. They do not appear to have a clear idea of how inhibited they actually are.

The various terms used by different authors in describing their cases are discussed. Since many authors have adopted the term *akinetic mutism*, the suggestion is made that this expression be used for all the varieties

of inhibition of motor function mentioned in this paper.

In cases showing other neurologic symptoms and signs, the localization of the lesions they indicate appears to have in common the mesencephalon and the region around the third ventricle. Autopsy and air encephalographic and operation findings seem to confirm that lesions in these areas can cause akinetic mutism.

Penfield and Jasper's description of the "centrencephalic system" is mentioned. These authors feel that akinetic mutism may be "an isolated paralysis of the centrencephalic system." This theory can explain how patients with akinetic mutism are inhibited in their cortical motor functions despite the fact that the cerebral cortex is not directly involved.

Development of akinetic mutism in patients with psychiatric disorders may be explained by a similar disturbance of the centrencephalic system produced by emotional stimuli.

A case of akinetic mutism in a five-and-one-half-year-old girl is described. The condition lasted for several weeks. Follow-up examination 15 years later revealed residual mental impairment, difficulty in articulation, and organic tremor. The etiology was thought to be epidemic encephalitis.

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MAYER-GROSS, W., SLATER, ELIOT AND ROTH, MARTIN. *Clinical Psychiatry*. Williams & Wilkins, Baltimore, 1960. xx + 704 pp., illus. $13.00

This textbook is one of the few which continue to aim at genuine completeness in surveying psychiatric diagnoses, etiology and treatment. Measured by these demanding standards, it is an excellent work, yielding a mine of information to the student.

As is natural, any work of this magnitude has liabilities as well as assets. The strength of the authors lies in the spheres of diagnosis, clinical phenomena, physical and genetic etiology, and physical treatment. In these areas the book is practically beyond reproach; illness after illness is discussed in an illuminating and interesting manner; each subject is put into good historical perspective, and the student is provided with an optimal number of references. Particularly worthy of note is the splendid work done on the subject of mental deficiency; this topic, ordinarily a wasteland in a textbook, becomes in the hands of the authors as fascinating as a novel. The chapter on legal psychiatry is equally good, but unfortunately does not give sufficient information about the situation in the United States to be of much applicable value for students in this country.

On the debit side, one must recognize the inadequacy of this volume from the point of view of psychodynamic etiology and treatment. In the introductory sections the authors include a brief critique of psychoanalysis, and make mention of the importance of sociology and psychology. Throughout, however, the emphasis is clearly on the physiologic and genetic aspects of psychiatry. Psychotherapeutic efforts are not ruled out, but one is left with the impression that their success is dependent upon the ability of the psychiatrist to be "wise and sympathetic," rather than upon any knowledge or skill. The large body of literature concerning psychotherapy is neglected.

With this significant exception, *Clinical Psychiatry* is a valuable addition to the teaching armamentarium. Within certain areas of psychiatry it is complete, scholarly and stimulating. One hopes that future editions will cover the psychologic and sociologic areas on the same high levels as are the historical, physical and genetic areas.

Peter F. Regan

SCHULTZ, JOHANNES H. AND LUTHE, WOLFGANG. *Autogenic Training: A Psychophysiologic Approach in Psychotherapy*. Grune and Stratton, London, 1959. xii + 289 pp., illus. $9.50

This brief monograph is a re-edited translation and interval literature report stemming from a book written by the senior author in 1932. According to Dr. Luthe's preface, it brings to the English-reading audience a review of "one of the most widely applied psychotherapeutic methods in central Europe." As such, it should provide a poignantly disturbing as well as revealing experience for the self-critical physician. The sections on methodology, clinical reports and research and theory contain no new scientific or clinical information. The book is nonetheless eloquent testimony to the insidious dangers of a cultist approach to the human being in pain and distress. It is an unintended documentary on the impatience of the physician to assume an active, didactic role in ameliorating distress in his patients, as well as to provide a rationale—however specious—for his therapeutic practices. It is also ample documentation of the vulnerability and pathologically intensified dependency needs of certain patients, of their readiness to "believe," of their quest to be doing something ordered and seemingly meaningful for

themselves under the duress of symptomatic distress. In a sense, this is an extended—if uncritical—report on the placebo effect, which is an undeniably potent and marvelously broad spectrum. What is new, however, is that the patient himself is first made the trainee-administrator and finally self-administrator of the placebo. The bond with the physician ultimately becomes one of faith only, though periodic evaluations by the physician of the strength and endurance of that faith are variably prescribed.

In his introduction to this American edition, Dr. Schultz briefly traces the historical origins of his system to studies of Oskar Vogt on autosuggestion dating back to the turn of the century. In his later, expanded studies of subjective experiences reported by patients during the development of hypnotic states, Dr. Schultz was impressed by the consistent reporting of feelings of heaviness in the extremities, followed by sensations of warmth. He soon discovered that similar subjective experiences could be "mobilized" by autosuggestions under the impetus of the physician. From these origins he and his associates, colleagues and "disciples" developed a broad range of standard autosuggestive formulae and meditative exercises which were applied, with individually tailored and largely trial-and-error modifications, to an impressively large patient population.

The volume is divided into three general sections. Part 1 (*Method*) describes in detail the attitudinal and concentration rituals which have been applied for the development of feelings of heaviness, warmth, abdominal warmth, forehead cooling, and for cardiac and respiratory regulation (though not usually in this order) in the trainee or patient. A subsection describes a series of "meditative exercises" for self-induction of states of altered perception and frank dissociation. Part 1 ends with a catalogue of "organ-specific" formulae related to common symptoms, and of so-called "intentional formulae." The latter are presented as techniques of mental support for assisting the trainee toward greater self-control in such habit disturbances as smoking, alcoholism and overeating, or greater self-discipline in waking, studying and so on. A representative quotation will alert the clinician to the orientation he will encounter in this book: "From experimental and clinical observations, it is known that the functional effect of physiologically oriented formula (*e.g.*, My right arm is warm) depends on and varies with the particular type of mental contact with the relevant part(s) of the body (*e.g.*, the whole right arm). In instances in which the trainee does not establish proper mental contact with the part of the body indicated by the formula, inadequate, paradoxic, or no results will be obtained." Translation from the German may occasion certain misunderstandings, but there are too many for such a simple explanation. The verbal report of the experience of one representative "trainee" during the respiratory exercise exemplifies the dissociative aspects of this approach and highlights one hazard in the procedure: "A feeling of warmth and a slight tingling flow through the whole body. The mental picture is of the brain connected with the lungs. The brain is also contracting and expanding. There is a feeling of weightlessness and detachment, an impersonal relation to myself."

Part 2 (*Clinical Applications*) details therapeutic experiences amplified by occasional brief case reports and many frank testimonials, all of anecdotal nature and with no semblance of implied or stated control of the presumed treatment procedures or effects. It is quite obvious from this section that autogenic training has been preached throughout Central Europe. The method has been applied in disorders of virtually every organ system, in painful states, in pregnancy and labor, in a wide spectrum of psychiatric disorders, in impediments of speech and in writer's cramp.

Clinical material is derived from a cited bibliography of 604 references, 14 in English, the remainder from the Central and Western European clinical periodical literature.

Part 3 (*Research and Theory*) correlates changes in a variety of autonomic variables with shifting autosuggested states. Two glaring defects, among many, limit our confidence in the stated correlations: 1) absence of conscientious recording of spontaneous variations unrelated to autosuggestive manipulations over time, and 2) lack of differentiation of autonomic changes which might be expected to follow or accompany the voluntary postural and tonal status changes of the subject from those presumed to result from passive concentration effects.

This book is in one respect particularly dangerous as a therapy manual. The rituals can readily be understood and taught by a person with no medical or scientific sophistication. The exercises are incredibly naïve in formulation and content, yet so specific that any literate or near-literate layman can incorporate them into a pseudoscientific repertoire. Control of their exploitation by unprincipled and untrained practitioners of the cultist "healing arts" in this country would be virtually impossible. For the legitimate clinician who is too easily enchanted with his therapeutic prowess, however, this report should bring a sobering lesson. To the extent that he can come to see his foibles and his weaknesses more clearly in the mirror of this book, it has value.

John I. Nurnberger

HALLMAN, RALPH J. *Psychology of Literature: A Study of Alienation and Tragedy*. Philosophical Library, New York, 1961. 262 pp. $4.75

Whether this book is a contribution to the psychology of literature or merely a literary view of psychology is a question. In the definitive work, *Theory of Literature*, Wellek and Warren discuss the relationship of psychology to literature: "By 'psychology of literature,'" they state, "we mean the psychological study of the writer, as type and as individual, or the study of the creative process, or the study of the psychological types and laws present within works of literature, or, finally the effects of literature upon its readers (audience psychology)." Hallman's volume does not seem to be addressed to any of these problems. Quite apart, therefore, from the substance of the work, the title is utterly misleading.

The motif of this book is man's "alienation" from himself. This reviewer must confess, however, that throughout its reading he suffered from a sense of "alienation" from the book.

Hallman's thesis seems to be that primitive man, utilizing ritual magic in lieu of logic, was essentially "integrated" with himself, if not with the external world. Gradually, through the evolution of speech and language, the development of intelligence, and his devotion to "toil," man has lost his sense of identity. This has led to the Dionysian ritual, in which death and rebirth become a repetitive, symbolic need. This is the essence of tragedy, and the result of "alienation." The purpose of a work of literature is "to transform the psychological need (to die) into an esthetic necessity." Although never explicitly stated, the tenor of the author's statements seems to be that literature and tragedy are synonymous, or perhaps that only tragic literary works are worthy of psychologic scrutiny.

Hallman's book raises several basic questions. One is whether literature can be so narrowly defined. The title suggests a scope for the work belied by the text. Literature in terms of the varieties of literary forms and their specific functions and psy-

chologic meanings is nowhere discussed. Nor does Hallman's bibliography indicate that eminent literary critics especially interested in the psychologic approach to literature—for example, Lionel Trilling and Edmund Wilson—have been consulted for their views.

Another question has to do with the definition of psychology and its limits. We are well past the time when psychology was a subdivision of philosophy, and indistinguishable from its methods and subject matter. Hallman's theses are philosophic speculations, and do not belong within any of the organized theoretical approaches to the problems of psychology as most psychologists would understand them. Although he leans heavily on psychologic ideas and terminology, his understanding of them seems to be imprecise. This is particularly striking when he turns to psychoanalytic theory to support some of his arguments. Instances of this looseness with terms and concepts are numerous; the following will suffice as an illustration: "Psychoanalysis has it that suffering becomes most intense at that instant when we realize that our death wishes cannot furnish a resurgence of ourselves. It is at that moment when, having been driven back into ourselves by the harshness and rigidity of reality, our own psychic forces drive us forward again out of sheer terror of being incestuously absorbed by the Mother Power."

This is not Kierkegaard or Sartre, although some of the ideas have a faintly reminiscent quality. In searching for some metaphoric analogy with which to convey the author's tone and approach, I was reminded of the program notes of a music critic trying to convey to an uninitiated audience the subtleties of a contemporary atonal composition.

From the point of view of a psychologist there seems little to recommend this book. The possibility cannot be overlooked, however, that a literary critic might consider that its potential value has been underestimated.

Victor H. Rosen

TROJAN, F., ED. *Current Problems in Phoniatrics and Logopedics.* Vol. 1. S. Karger, Basel/New York, 1960. xviii + 226 pp. sFr 38.—

This volume, an anthology on speech disorders and their treatment, was prepared to pay tribute to Professor Richard Luchsinger on his sixtieth birthday. Some of the papers are written in German, some in French and some in English, but each has an English summary.

The volume is divided into three sections, dealing with the physiologic, physical and psychologic aspects of phoniatrics and logopedics. There are 30 papers, of which 15 treat the psychologic aspects and nine the physiologic. Most report on highly specific aspects of problems in the field—for example, genetic studies of a specific disorder, surgical procedures for a specific disorder, stroboscopy vs. laryngoscopy for diagnosis, or self-perception of dyslalic errors. Some are merely case reports. A few papers are less specific; among them, and of especial interest, are descriptions of the neurophysiology of the larynx, a survey of connections between neurology and speech therapy, and the socio-educational aspects of logopedics. There are no broad reviews or surveys of the field, and the editor has introduced no discussions, appraisals or summations.

Any reviewer's critique would necessarily be limited, since the volume covers so diverse a field. (This reviewer is a psychiatrist.) Three comments, however, seem in order. First, some of the papers, especially in the first section, are impressive methodologically, either because of the use of ingenious research tools, or because of soundness of design. Second, the volume is quite

technical and specific, so that its use as a whole might be more appropriate for the reader already sophisticated in the field than as a textbook for the uninitiated. Third, coverage in the behavioral science field seems to be quite incomplete and, in spots, inadequate. For example, linguistics is discussed only in regard to broad areas of possible contribution to phoniatrics; relevant areas of basic neurology, developmental psychology, communication and psychotherapy are omitted, and the whole subject of psychodynamics is dealt with only by a polemic. However, the book is marked "Volume 1," so perhaps these omissions will be corrected.

Albert E. Scheflen

BARTON, WALTER E., FARRELL, MALCOLM J., LENEHAN, FRANCES T. AND MCLAUGHLIN, WILLIAM F. *Impressions of European Psychiatry.* American Psychiatric Association, Washington, 1961. x + 129 pp. $4.00

This concise, readable report on a six-week survey of psychiatric programs in six Western European countries will appeal to anyone who has traveled or plans to travel, and whose interest in psychiatry is not limited by our national boundaries.

The emphasis is on mental hospitals and their programs, with particular attention to services, hospital administration, therapy and rehabilitation.

Visits to 47 installations, and many conferences with informed personnel, gave the authors a valuable opportunity to compare findings and practices.

Among the most interesting chapters are "Effects of the Open Door," "Home Visits" (including accounts of many on which the authors accompanied the visiting psychiatrist), "Admission Policies," "Training in Psychiatry," "Specialized Facilities," "Therapeutic Philosophy" and "Programs and Progress in Research."

There is an excellent chapter on psychiatric nursing, and a brief but important one reviewing unsolved problems and speculating on future trends.

Value judgments have been avoided, and the authors' observations are not colored by prejudice. Their dedication to purpose is evident throughout the report, as is the hard work that lies behind it.

Henry P. Laughlin

KOLLE, KURT. *Psychiatrie: Ein Lehrbuch fur Studierende und Arzte.* Georg Thieme, Stuttgart, 1961. xi + 418 pp., illus. DM 29.80 ($7.10)

This new textbook of psychiatry was written by an experienced clinician and teacher. The presentation is clear, concise and sufficiently basic to be of value to the medical student and young physician. The psychiatrist will be impressed by the warmth and emphatic understanding the author shows for his patients, which may be responsible for some of his therapeutic achievements. The numerous case histories illustrating the theoretical discussions are based on a vast experience in clinical and forensic psychiatry. Throughout the book the author remains close to general medicine, emphasizing the need for thorough neurologic training of the young psychiatrist.

The text is divided into four parts: general psychiatry, special psychiatry, applied psychiatry and scientific psychiatry. The first two parts correspond to what in this country would be called basic and clinical psychiatry, and constitute the bulk of the book. The third part deals with treatment, mental hygiene and forensic psychiatry. In the final chapter, the history of psychiatry and research in psychiatry are briefly discussed.

The book reads easily, almost like a novel, and is permeated by the author's devotion to the teaching of psychiatry and psychiatric principles in general medicine.

Irene L. Hitchman

SHIPLEY, THORNE, ED. *Classics in Psychology*. Philosophical Library, New York, 1961. xx + 1342 pp. $20.00

Even in the more august universities in this country a student still finds it possible to complete an undergraduate program in psychology and pursue graduate training to the doctorate without ever reading a single word in the original of the giants who pioneered the science in the last hundred years and more. (Freud, with perhaps one or two others, would stand as the exception.) Thus there are more psychologists than not whose passing awareness of the work of such significant figures as Wundt, Titchener, von Helmholtz and even James has been derived from compressions shorn of the sensitivity and vigor of the first writings; and equally, there are many psychiatrists who have not read Pinel, Charcot or Esquirol.

It has in fact become almost traditional in scientific education to by-pass the primary source, to present historical background and basic early contributions by means of the severely edited digest, the simplified recapitulation. Expediency and efficiency are the accepted rule of thumb; there is much to learn, and collections of abridged readings smooth the way for the learner, facilitating the elimination of redundancy and findings later disproved. (This latter is a common, and specious, argument against the primary source.) There are many—and much used—collections of compressed readings in the field. Most are geared to undergraduate teaching, are of textbook size, and necessarily provide no more than a series of brief fragments. Some (*e.g.*, those of Garrett and of Dennis) have proved most useful. By and large, however, the tendency to keep the historical and the original at some distance has made no contribution to the development of academic scholarship.

The present volume swims against this stream: it provides, in the full, selections from leading psychologists and psychiatrists of the last century and a half. The book makes no salute to the banner of capsule scholarship; it is a substantial four-pound handful, presenting 49 papers by 38 authors in some 1340 closely printed pages. The shortest, James McK. Cattell's first formal statement on mental measurement, reprinted from *Mind* (1890), takes up 12 pages; the longest, William James's classic "Stream of Thought" chapter taken from the 1890 edition of *Principles of Psychology*, covers 73 pages. Three of the essays—those by Herbart, Wertheimer and Wundt—have not previously been translated into English. (Wertheimer's is the only article which has been substantially shortened in the interest of space.) In the introduction, the editor attempts to set the selections in historical perspective and reveals, somewhat unnecessarily and at length, his own favorable bias toward Gestalt psychology. Each selection is followed by a short vita and some references of historical importance to the work of the writer.

There can be no agreement as to what is "classic," but it should be noted that these selections have been made with seeming care, with an eye to representing basic positions of the writers. None is atypical, though many are not well known, and several have been taken from fairly rare sources. A number of the articles illuminate significant weaknesses in our knowledge of both people and events. The date of Pinel's Grande Geste, as a single important instance, cannot be accurately determined.

The social scientist of whatever persuasion will find nourishment here. As random examples only: The paper by Binet and Simon will be of considerable interest to the psychologic clinician; it is the 1905 description of the first tentative form of the famous intelligence test. Though later much modified, this early version is most revealing of the problems that had to be defined and overcome. The Titchener selection is his 1898 reply to Caldwell's highly

critical review of the *Outline of Psychology*. One wonders how many present-day experimentalists have even a nodding acquaintance with this original and elegantly written statement of Titchener's approach. Benjamin Rush is represented by a chapter from the first edition of his *Medical Inquiries and Observations*. To read this physiologic investigation of "the diseases of the mind," which came into print in 1812, is to put bone and muscle on the habitual characterization of the man as the pioneer of American psychiatry.

The price of the book undoubtedly will tend to consign it more to the library stack than to the personal bookshelf, and this is to be regretted. It is a worthwhile anthology, one which will help the thoughtful reader to place many of the important historical issues of psychology in proper perspective. Highly recommended.

H. A. Robinson

DENNIS, WAYNE, CARTWRIGHT, DORWIN *et al.* *Current Trends in Psychological Theory*. Univ. of Pittsburgh Press, Pittsburgh, 1961. ix + 229 pp., illus. $6.00

In 1947 the Department of Psychology at the University of Pittsburgh began a series of yearly conferences dealing with current problems in psychology. The present volume contains the papers delivered at the tenth such conference. Three of the contributors (Wayne Dennis, Dorwin Cartwright and E. Lowell Kelly) wrote about the changes in the ten years since the first conference. The remaining contributors dealt with particular problems in physiologic psychology, learning, thinking and personality.

What can one say about so heterogeneous a collection of papers? Some are very good; some are surprisingly uninformative. Some hang together with the others; some stand in splendid isolation. Perhaps the best strategy is to deal with those that hang together and then mention those that do not.

Cartwright and Dennis give us rather gloomy pictures of the decade in psychology between 1947 and 1957. Dennis presents rather convincing evidence that the research productivity of psychologists is going down. Would anyone have thought so, in view of the publication lag in the journals? Apparently it is so, and only the increase in the numbers of psychologists has prevented the absolute amount of research from declining. This reviewer is not sure that Dennis provides altogether convincing reasons for this relative decline, but he does provide a clear warning about the scientific underpinnings of the professional activities of psychologists.

Cartwright is less specific, but he implies that the head of steam that developed in social psychology immediately after the Second World War is gone. There is an increase in sophistication among social psychologists doing research, but these psychologists are less enthusiastic, more cautious.

Kelly, by contrast, is more optimistic about clinical psychology. He is worried, however, lest clinical psychology get too far away from psychology as a whole. He wants less specialization in the Ph.D program in clinical psychology, and he wants clinical psychologists to present ideas to other psychologists as well as to borrow from them.

Three papers are concerned with physiologic psychology. To this reviewer (perhaps because he has not kept up with recent advances in physiologic psychology), these were among the most interesting in the book. Very likely, however, the physiologic psychologist would find them old-hat. It is certain that Fisher, Rosensweig and Milner have produced new results far beyond what they presented in 1957. Fisher describes his extremely ingenious techniques for studying the influence of chemical action on neural mechanisms and behavior. Rosensweig gives us a review, as of 1957, of the California studies on the correlation of brain cholin-

esterase and behavior. Milner presents a neurophysiologic model of decision processes.

The two learning papers present familiar information. Skinner makes a plea for the experimental study of human behavior. Much of what he says has been said before. He is against mathematical models, introspection, common sense in psychology and other bugaboos of positivism. Estes presents us with some specific derivations from statistical learning theory. He makes an extremely interesting beginning at deriving certain facts about drive from the same mechanisms he uses to treat forgetting and distributional phenomena.

For this reviewer, the most interesting item was the Newell and Simon paper on the simulation of human thought. These authors recommend a serious application of Turning's test, which provides a very stringent criterion for the computer analog of human thought. Kendler's paper on problem solving will be very useful to people working on his problems, but will probably be less interesting to the general student of human behavior than the Newell and Simon paper. It is interesting to speculate as to which approach will be ahead ten years from now, the experimental-theoretical program of Kendler or the simulation program of Newell and Simon.

Mowrer is hopelessly difficult to summarize. He is all tied up in his attempt to make psychologic use of the concepts of sin, expiation, guilt and remorse. Mowrer's ideas may well be important, but it seems likely that the paper presented here will be only a footnote.

In summary, then, this is a browsing book, one to keep handy for idle leafing. Certain papers belong on the reference shelves, and undoubtedly psychologists, physiologic psychologists and perhaps others will make such use of some of the individual papers.

James Deese

FRANK, JEROME D. *Persuasion and Healing: A Comparative Study of Psychotherapy.* Johns Hopkins Press, Baltimore, 1961. xiv + 282 pp. $5.50

This is not an easy volume to review because it touches on so many aspects of human culture: psychotherapy in general; psychotherapy in America; religious revivalism and thought reform; religious healing; placebo effects; experimental work on persuasion; individual and group psychotherapy; traditional and modern concepts of hospital organization; investigations of the relationships between changes in attitudes; and the relief of symptoms.

To deal adequately with these complex issues, each chapter would have to be a monograph. This reviewer attributes many of the defects of the volume to the condensation which results from trying to cover too much. The most glaring example of this is the fact that, although the volume is called "a comparative study of psychotherapy," there is no attempt to characterize either the differences or the similarities among the various psychotherapies, nor to range them into homogeneous groups. Yet it is impossible to make a comparative study of these processes unless they are first categorized in some systematic fashion. Nor is there any systematic exposition of any single theoretical or technical school, or discussion of how either to control or to allow for the influence of the many concurrent extrinsic economic and social variables which play a crucial role in all processes of therapy. I came away from a careful reading and re-reading of this volume feeling that there are grains of truth in almost every word that is written, but that these are buried in the gritty sands of unspoken *a priori* assumptions. I make this criticism not only where I disagree but equally where I agree, and not only where Dr. Frank is critical but

also where he praises, and whether his comments have to do with group therapy, individual therapy or analytical therapy.

In this connection John Whitehorn's foreword contains some sage advice, the implications of which come close to my own uneasiness. Whitehorn points out that in psychiatry we sometimes "perform better than we understand." While this can be true for a limited time, it cannot continue indefinitely. To perform better than we know is possible only in the early stages of a young science. In the end performance will flag unless understanding catches up. One of the tragedies of psychiatry arises out of the fact that precise knowledge continues to drag its feet. Therefore the state of affairs described by Whitehorn is not one for us to accept with complacency.

Nor can one doubt the advisability of asking questions serially, as Whitehorn suggests—but again we must add that we are forced sometimes to content ourselves with having our questions left unanswered for decades. And during these long years we must guard against the impatience which so often leads us to make premature claims. Since this reviewer is constantly battling the premature claims of his fellow-therapists, he may perhaps be trusted to battle some of the premature claims advanced by the critics of psychotherapy.

Dr. Whitehorn finally points out that it is sometimes necessary to identify "common factors as steps towards the identification of significant differences." Because the volume, in spite of its claim to be a comparative study, lacks any discussion of "significant differences," but lumps them all together in an undifferentiated mass, this reviewer feels it necessary to reject this keynoting apology for one of the major omissions of the volume. Is it in fact ever possible to "identify common factors" without simultaneously recognizing differences? Or is it ever possible to recognize differences without recognizing common elements? Must not any certain recognition of either imply the concurrent recognition of the other? This is not an academic issue: for various reasons some people cannot accept the fact that there are significant differences among peoples, among religions, among cultures, among therapies. Therefore they have to see and stress only the elements which make for similarities. For opposite idiosyncratic reasons, others cannot accept similarities or uniformities, but are forced by their own masked inner needs to emphasize and even to exaggerate unique features, or even the false appearances of uniqueness. Analysts are liable to this latter bias and, in their obsession with uniqueness, often fail to recognize that there are many elements in common between psychoanalysis and that which others know and do. (As an example, your reviewer would single out the fact that much that is called ego-analysis is actually adroit, analytically-informed psychiatric social work, which has always been carried out in intelligent psychotherapy by analytically-minded non-analysts, but not under the high-sounding title of "ego-analysis.") On the other hand, non-analysts not infrequently suffer from the opposite bias, *i.e.*, the tendency to minimize all differences among psychotherapeutic processes. This gives rise to a tenacious vagueness. These human frailties among psychiatrists in both camps lead the one to underestimate differences and the other to overemphasize them. As theoreticians, investigators and reviewers, we have constantly to guard against such biases; but our varied and respective fallibilities do not justify a dismissal of the real issues.

Precisely here is where one of my major difficulties arises. If we do not yet know enough about the intrinsic nature of any one of the psychotherapies, then each must be studied objectively and in microscopic detail *as a process*, before any comparative evaluations are attempted. While doing this we should not jeopardize or becloud our objectivity, or distract ourselves from basic

issues by imposing premature value judgments as to what constitutes getting "better" or getting "worse." We must first establish satisfactory criteria for change in either direction before we can hope to identify what these various procedures have in common, or how they differ one from another with respect to their capacity to alter the course of the neurotic process. This consideration leads me to wish that this book represented the outcome of 25 years of dispassionate study of samples from films and tapes of every kind of psychotherapeutic procedure conducted by many different therapists, plus observations from behind one-way screens, plus Dr. Frank's personal and sustained involvement in each of the various psychotherapeutic processes himself, with no axe to grind for or against any one of them.

Instead, this critical problem is by-passed with one debatable assumption: that the essence of all psychotherapy is an "attempt to heal by persuasion." As a working hypothesis this could be a useful point of departure for such sustained observations as those listed above, for careful sampling and, finally, for precise experimentation. But it is indefensible to use it as a self-evident premise.

My own experience leads me to a directly contradictory working hypothesis: that persuasion is more often than not a psychonoxious contamination of the therapeutic process, one which arises largely out of the emotional vulnerability of the therapist when he finds himself confronted by intimations of impending failure. One can almost say that persuasion is a counterfeit substitute for therapy, an impatient effort to find a short-cut to a simulation of health. We may fall back on persuasion when more exacting therapeutic goals elude us, or when we evade the challenge of attempting to achieve basic change, or when we are convinced that any attempt at basic change would be inadvisable or perhaps even catastrophic for a patient. Persuasion is surely one of the important ingredients in legitimate palliative therapy. But to regard it as the core of psychotherapy itself is to beg the basic question by implying that psychotherapy can never alter the etiologic processes which produce psychopathology. The descriptive definition by the late Austen Fox Riggs comes much closer to the heart of the matter. He wrote that "*psychotherapy is the effort to heal a man through the medium of his own mind.*" That persuasion may enter into any such effort is clear; but when its intrusion into the process is legitimate and when illegitimate, when it is psychonoxious and when it is psychotherapeutic, should be a matter of rigorous research, not of arbitrary assumption.

Actually, this is an example of another defect which pervades the structure of the book, *i.e.*, its failure to clarify the intimate interplay between psychonoxious and psychotherapeutic influences in the course of every form of psychotherapy, whether placebo or psychologic, whether religious revivalism or thought-reform, analytic or non-analytic.

While it is of course true that this volume is not designed for technicians in the field, it seems to me that even for the layman—and perhaps especially for the layman—precision in the use of conceptual tools is necessary. When writing for a mixed audience, partly technical and partly non-medical and non-technical, one must be careful not to omit a full exposition of the complexities of the field. To slight these in an effort to clarify creates unrealistic expectations, and makes healthy and creative differences of opinion among sincere and informed specialists appear to be trivial and immaterial, when in fact such differences of opinion provide the rich soil out of which comes growth, and are an index of the struggle for maturity in the development of any science. I therefore find it difficult to be sympathetic with any tendency—even when I know it to be unintended—to

sweep difficulties under the rug, or to make that which is hard and complex in nature appear to be easy and simple.

Another example of this tendency to oversimplify complexities is found in the discussion of organic illness. Here only the pain and stress of organic disease are mentioned, when in fact the more remarkable and illuminating role of disease in psychopathology is the extent to which men can use organic conditions paradoxically to mask psychologic problems. The escape into euphoria which many women find in pregnancy is an everyday example of this. I almost wish that Dr. Frank had begun his studies of the process of "therapeutic" change by asking himself how it happens that a full-blown psychosis can temporarily become free of all symptomatology in the presence of organic pain or of organic disease. Or he might have asked himself why symptoms sometimes disappear among neurotics as well as psychotics during periods of physical pain or organic illness or external stress (such as the London Blitz), only to reappear when the noxious somatic or external circumstances improve. Clearly, such fluctuations in the symptomatic manifestations of the neurotic process, or in the disability and pain it imposes, or in the concurrent emotional upheavals, do not imply basic shifts either toward greater health or toward deeper illness. No one would say that a patient was well merely because for a time he had shed his symptoms. Such considerations as these would have led Dr. Frank to ask himself what role, if any, persuasion plays here.

Similarly regrettable for the exposition of these issues is the failure even to mention the guilt-assuaging value of pain for the symptomatic relief of depression, and the more general fact that all organic disease can be used as a covering device, *i.e.*, for the same psychologic and emotional purposes as any hysterical conversion symptom.

We must avoid deceptive indices; any study of the efficacy of therapeutic intervention must include a study of all such spontaneous phenomenologic shifts as they occur in nature, as they occur every night in Everyman's dreams, or every day in Everyman's moods. It is against the background of these spontaneous symptomatic shifts that the psychotherapeutic and psychonoxious processes must be studied. Therefore, these questions are basic to any exploration, whether of the etiology of neurotic and psychotic disturbances, or of their therapy.

This limitation in the discussion of the complex emotional and psychologic values of organic disease is paralleled by a failure even to mention what is perhaps the most important challenge with which psychologic illness confronts psychotherapy. In addition to the suffering that neuroses cause to patients, most neuroses hurt other people even more than they hurt the patients themselves. Indeed, many people conceal their neurotic processes from themselves and from others for years. They function well at their jobs and do not suffer. That they will ultimately come to grief is inevitable, but for long years everyone around the patient may suffer—but not the patient himself. This is a further reason why the patient's own state of suffering or of comfort, his adjustment to work or incapacity to work, are incomplete and misleading criteria of therapeutic results. As psychiatrists who hope some day to be able to prevent human tragedy, we cannot overlook the remarkable fact that some people can use a simulacrum of a healthy adjustment to mask latent processes of neurotic illness, which will erupt into manifest forms later in life. This is the typical story of the "campus hero," who throughout his school years does well academically, socially and athletically—*i.e.*, in both curricular and extracurricular activities—yet shows, when he breaks down in the thirties, forties or fif-

ties, that this earlier period of seemingly good adjustment was merely a successful mask. No sophisticated study of the psychotherapeutic and psychonoxious processes in life can omit consideration of these subtly disguised manifestations of the neurotic process.

The discussion of placebo effects is similarly incomplete. Here my protest is against the tendency to generalize instead of to particularize. The significant lessons which can be learned about psychotherapy from the study of the reactions to placebos would come from detailed comparisons of the personalities or conditions which secure relief from placebos with those which do not, what kinds of symptomatic disturbances are relieved by placebos and what fail to respond, and so on.

It is difficult to summarize Dr. Frank's attitude towards psychoanalysis. Scattered through the chapters are references to the challenges, the problems, the assets, the difficulties, the virtues and the vices of psychoanalysis, and to the many unsolved problems of analytic technique and training. Nevertheless, in certain important passages Dr. Frank refers to the importance of the self-image and to the conflicts which can arise among conflicting self-images and between the self-image and the image of others. Quite as analysts would, he also describes systems of self-images as "*existing on various levels of consciousness.*" In slightly different terms, these are well established analytic concepts. In the Meyerian tradition, Dr. Frank prefers his own words for the phenomena, or uses Hadley Cantrill's term, "assumptive systems." This, too, has its value—because the term is new and relatively unfamiliar, and so for the moment remains uncluttered by irrelevant and contradictory implications. Unhappily it will not remain unalloyed for long. As it gains in popularity it will suffer the fate of most psychologic conceptual tools.

Dr. Frank also writes of the therapeutic value of shifting from "unhealthy assumptive systems" to healthier ones; but precisely what he means by healthy and unhealthy images (or "assumptive systems") is not explained. Nor is there any account of how such shifts are to be achieved. Yet this is certainly one of the nuclear problems of all psychotherapies. We know that where a distorted self-image has dominant unconscious determinants, mere reassurance and education do not achieve a lasting desirable change. Nor does success. Man did not have to wait for psychiatry to discover that success itself may turn to dust and ashes, or that success can be crowned by profound depression, panic, and even psychosis and suicide. Clearly neither "persuasion," nor verbal reassurance, nor the reassurance of an effectively and successfully productive life, nor the plaudits of one's fellows, can eradicate these distorted and early-acquired images of ourselves, or their destructive later manifestations in the neurotic process. Unhappily, there is in this book no discussion of the universality of this problem in the present state of human culture, nor of its infinite capacity for damaging human life, nor of its relative tenacity and resistance to change, even under the impact of different psychotherapeutic procedures, often including psychoanalysis itself.

It is therefore not surprising that, in turning to Dr. Frank's criticisms of psychoanalysis and of analytic procedure, technique and training, the reviewer finds himself in an unstable equilibrium between agreement and disagreement. As above, almost no word that Dr. Frank writes is without its elements of validity. This is true of his many gentle but perceptive and valid criticisms of analysis. What he omits is the fact that the limitations to which he alludes are well known to analysts, that they are recognized and acknowledged, that they are the focus of constant concern, and that they are being actively studied by analysts. Although their correction is certainly not Dr.

Frank's responsibility, it would seem to be his responsibility to recognize that rectification is by no means easy, that it will take long and difficult study, and that many analysts are hard at work at the task.

Two chapters deal with investigations in which Dr. Frank himself has been involved. One is the chapter on the relationship between symptom relief and attitude change. Here I find myself in deep trouble. As already indicated, the major point of divergence is over the question of whether relief from subjective distress and/or improvement in functioning are accurate indicators of a therapeutic change. Is therapy adequately measured by symptomatic relief? Or is it a process which aims to eradicate underlying sources of difficulty? This question is not asked. Yet it involves a definitive differentiation between sickness and health, and a definitive differentiation among psychonoxious, psychomasking and psychotherapeutic processes. These are lacking.

Another chapter on experimental studies deals with the role of persuasion. Here one finds references to data which are of basic significance—particularly to work which has demonstrated the role of subliminal, preconscious cues in all processes of communication among men. This is in line with recent developments in psychoanalytic research, and it is interesting to find this experimental confirmation of it from nonanalytic sources. One is surprised, however, to find no references to the searching experimental studies which are being actively carried on by several analysts (Fisher and others), or to the analytic discussions of the role of subliminal cues in early development, in personality formation, in identification, and in transference phenomena, as well as in communication in general.

Many confusions have their origins in a misunderstanding of the relationship between persuasion and the goals of psychotherapy. (Note that I stress here not its achievements but its goals.) Among these confusions have been the writings and the talk about its relationship to brain-washing. This might best be called the Argument for Guilt by Loose Analogy. I refer to this here, not because Dr. Frank makes much of it or misuses it, as many others have done, but because his inclusion of it at all gives this shoddy argument a gloss of scientific respectability it does not deserve (*cf.* editorial, **133:** 281–282).

Finally, I must comment on the bibliographic omissions. There is no reference to Lewin and Ross's critical and scholarly survey of psychoanalytic education in this country conducted for the American Psychoanalytic Association. There is no reference to the embryonic work of the Central Fact-Gathering Committee of the same Association. Furthermore, only early editions are mentioned of books that have been extensively revised and rewritten in the intervening decades.

No mention is made of the effort of the Berlin Psychoanalytic Institute to evaluate psychoanalytic psychotherapy after its first ten years of existence. (This was published in 1930; it was understandably naïve, but it was a significant start.) Since then, in the American literature alone, many publications have dealt with the problems of research in the field of psychiatry and psychoanalysis, and specifically with the extraordinarily complex problems of evaluation of all therapeutic results in psychiatry. Most of the discussions of these problems were by panels instigated by analysts but including representatives from all relevant aspects of behavioral science. They explored the formidable technical and statistical difficulties of carrying out such studies, without minimizing them or offering oversimplified solutions. Out of them have come such important new developments in methodology as the systematic use of tape and film to record data for the microscopic study of adequate samples (Shakow and Cohen, Renneker, Kubie, Cornelison, Redlich, Gill, and others). None of these developments

has as yet solved all technical difficulties, and none has been in use long enough to yield definitive answers. We can expect them to bear fruit over the next 25 years. Not to refer to any of these studies, even unintentionally, will have the effect of confirming in the minds of some readers the notion that analysts are indifferent to these problems. The same omissions may also tend to reinforce the widespread blindness to the complexities of the technical problems which must be overcome before such studies can hope to have definitive value.

There are those who say, "But you have to begin somewhere." The answer is, "Of course," but the place to begin is at the beginning, not at the end. This means that we must begin, not by reporting results based on *ad hoc* value judgments and supported by unproved methods, but by an unsparing study of the technical difficulties that must first be surmounted. The lack of this is the crucial fallacy in the spirit and content of this volume.

Lawrence S. Kubie

QUASTEL, J. H. AND QUASTEL, DAVID M. J. *The Chemistry of Brain Metabolism in Health and Disease.* (Monograph, American Lecture Series.) Thomas, Springfield, Illinois, 1961. xi + 170 pp., illus. $6.50

The question, Is there such a field as neurochemistry and, if it exists, does it have any bearing on the problems that concern me?, is often asked these days by physiologists, neurologists, psychiatrists, biologists, endocrinologists, psychologists and others. Those who do not have either sufficient time or the necessary detailed background to evaluate the data available in individual articles and in sizable volumes treating special aspects of neurochemistry can now turn to this book to find their own answers to the above question.

Written as a brief survey of some of the highlights of the subject, the book obviously was not planned for an audience interested in a textbook, or in a book containing a detailed survey of some of the aspects of the field. (The senior author is one of the editors of just such a book, the second edition of *Neurochemistry*, which will appear shortly.)

In the 124 pages of text, the 524 references and the detailed index, the authors achieve a survey that is a masterful combination of the various aspects of the field. Basic metabolic events are discussed in a framework of the fuller understanding of metabolic defects that underlie clinical symptoms, and data obtained with isolated systems are skillfully combined to point to *in vivo* metabolic events and to the possible action of drugs. Without further involving the reader in detail, but with the help of carefully chosen examples, the authors demonstrate the working of basic mechanisms in health and disease.

Perhaps the only addition this reviewer would wish for is a brief summary at the end of each chapter. It is true that, by summarizing the subject covered in a chapter, an author is forced to make simplifications, or perhaps to make the conclusions appear firmer than they would be, based on the not yet completely available facts. For this reason, the hesitation of the authors to add too much interpretation is understandable. However, critical statements evaluating the field today, or pointing out the most likely advances, assure that the reader does not get lost in the forest of facts but finds a path he can explore in the future. This may be necessary in the present volume because of the probably large proportion of "uninitiated" among its readers, and because space limitations do not permit the authors to go into enough detail on any of the subjects to enable the reader to draw his own conclusions from the data presented.

In the limited space available the authors have managed to touch upon many subjects and to arrive at what is from many points of view a well balanced book. Since we know

comparatively more about cerebral energy metabolism, this is dealt with in greater detail. As in the other chapters, energy metabolism is discussed from the point of view of such basic metabolic pathways as glycolysis, the alternate pathway of glucose oxidation and oxidative phosphorylation, clinically detectable disorders like diabetic coma, and such altered *in vivo* or *in vitro* metabolism as the effects of glucose deprivation on mental function, synaptic transmission and so on.

Nutritional deficiencies such as pellagra and beriberi form a chapter, as does a discussion of permeability and transport phenomena, including something on permeability changes in poisoning or convulsions. There is a discussion of amino acid metabolism—for example, decarboxylation and incorporation into proteins—under normal conditions and also in such cerebral dysfunctions as phenylketonuria. Amine metabolism is presented more from the factual than the speculative angle, and lipid metabolism from the point of view of biochemical aspects of lipidosis. A short section deals with the action of such drugs as alcohol and chlorpromazine on brain metabolism, and the volume closes with discussions of the biochemical aspects of schizophrenia and of mental defect.

Most of the references cited in the bibliography are original articles, but the authors also note most of the important summaries covering the pertinent points. The view of the authors, and probably of most neurochemists—that the majority of psychiatric and neurologic disturbances are caused by conditions altering cerebral metabolism, energetics or transport—is clearly put across. If the interested reader of the book goes beyond this volume to further his studies and interests, the authors have accomplished an important task—indeed, filled a gap.

Abel Lajtha

MOWRER, O. HOBART. *Learning Theory and the Symbolic Processes.* Wiley, New York, 1960. xiii + 473 pp., illus. $8.50

As the body was to Victorianism, so was the mind to early behaviorism: a shameful, somehow corrupt thing, not befitting a proper science, and reserved for strictly private discussion. The only decent topics of conversation concerned observable stimuli and responses, and the established connections between them. To learn was merely to acquire a heightened reflexive tendency (a *habit*) to repeat a previous response in the presence of an original stimulus (and drive). Rewards (*reinforcements*) strengthened such tendencies; punishments weakened them. Anticipation, thought, meaning, decision, with their introspective overtones, were all taboo words.

But behaviorism could not long continue to deny the obvious complexity in behavioral determination, and with the passing generations has come a tendency to be more open about the inner organism. A certain primness persists, however, for the new behaviorists feel compelled to cloak internal processes with the respectability of stimulus-response garb. Thus, miniature (fractionated) responses have been conceived as serving as symbols of past events, and as providing a basis for "cognitive" intervention between present stimuli and terminal responses. Nevertheless, there is something of merit here. The attempt to subsume both peripheral and symbolic activity within a parsimonious conceptual structure and, in so doing, to account for the *acquisition* of cognitive elements is indeed a laudable aim and deserves to be taken seriously.

A distinguished behaviorist who *does* take it seriously, but yet is willing to discuss thinking in cognitive terms, is Dr. O. Hobart Mowrer, past President of the American Psychological Association and recent author of two imposing volumes, *Learning Theory and Behavior*, and *Learning Theory*

nd the Symbolic Processes (the second the subject of the present review). In the two works Dr. Mowrer brings to a climax his own defection (begun some 15 years earlier) from radical behaviorism. In the process he converges with criticisms of *neo*-behaviorism, currently being aired by cognitively oriented psychologists. These critics, for one thing, decry the internalization of response language. (They wonder why, for example, implicit chewing responses are more viable symbols of food than redintegrated visual, olfactory or gustatory "images" thereof.) More importantly, the two-step chain—from external situation to symbolic response to peripheral response—seems to them as rigidly deterministic as the "single-stage" S-R model, so that they still have difficulty squaring this type of analysis with subjective experiences of search, choice and decision in behavior.

The behaviorists have replied that their adherence to stimulus-response connectionism renders them capable of accounting for action without resort to a *deus ex machina* of chooser, planner or decision-maker. In this they hit a sore spot which has plagued cognitive theory ever since Guthrie leveled his famous jibe at Tolman for leaving the rat "buried in thought": for if an organism learns cognitions rather than reflexive response tendencies, how exactly does it get from such cognitions to appropriate actions? Mowrer's two volumes, at their deepest level, comprise an extended theoretical odyssey directed at the solution of this problem.

Perhaps because his reaction to S-R theory was catalyzed by a concern with avoidance-learning and its emotional consequences, Mowrer's first volume concentrates more on the dynamics than on the mechanics of action, *i.e.*, on *why* rather than *how* the organism does what it does. There he seeks to establish a mediational resultant of learning which will provide attractive pull for subsequent behavior. For this he turns neither to fractional motor responses nor to imagery, but to implicit *emotional* responses—specifically, *hope* and *fear*. These he claims become conditioned (connected) in learning both to independent environmental stimuli (thereby accounting for approach and avoidance of *places*) and to response-correlated *kinesthetic* stimuli (thereby explaining facilitation and inhibition of *action*). All learning, then, is emotional conditioning, and acquired habits are not reflexive but *voluntary* actions, initiated to reactivate the positive emotion (hope) previously connected to motoric feedback stimuli.

The choice of emotional mediators, however, leaves Mowrer with a twofold deficiency, because it accounts neither on the one hand for how the organism *goes*, nor on the other hand for how it *knows*. (We learn, after all, not only that apples are good to eat but also that they grow on trees and occasionally harbor worms.) Indeed, Mowrer's own conception of action forces the cognitive issue: if the organism has the capacity to reproduce formerly rewarded responses, then it must necessarily be able to arouse within itself some symbol or model of them (and of their accompanying stimuli) to guide its efforts. Mowrer recognizes this problem, but defers its discussion for the later book, where the questions of cognition and selectivity in behavior are focal.

Mowrer actually launches his second volume with less sense of insufficiency than the above would imply. His initial intent is to test the scope of the dynamic position presented in the earlier work—one gets the impression of a decided reluctance to abandon the primacy of a *valuative* over a *cognitive* system. For example, he obviously still leans to the emotional side in Chapter II, where he concludes the discussion of latent learning (learning without responding) with the speculation that there may be different levels of mediation: *emotions* con-

stituting mediators of the "first order"; *pure stimulus acts* (to which emotions have already been conditioned), "second order" mediators; and "*purely mental*" (*cognitive*) *surrogates* for pure-stimulus acts"—images, words—"third order" mediators.

In his analysis of meaning (Chapter V), however, Mowrer inverts this emphasis, albeit somewhat hesitantly. Here he faces the question of what the mediating reaction might be which underlies the meaning of a word. He recognizes that conditioned emotional responses cannot carry all of meaning, since meaning is as much denotative (and cognitive) as emotional. (Indeed, in traditional linguistic analyses, emotional meaning is not considered to be meaning at all.)

To shoulder the burden of denotative meaning, Mowrer opts for an attenuated sensory (*imaginal*) over an attenuated response mediator. According to this view, in the early experience of a child, when a particular word, *e.g., ball*, is paired with a *ball object*, the auditory stimulus is conditioned to the stimulus complex, visual, tactile, auditory and so on, which constitutes the experience of the *physical* ball. On subsequent occasions, when the auditory sign alone is heard, a replica or "image" of this stimulus complex is associatively aroused, so that the child comprehends the referential meaning of the word.

This concession to imagery inevitably shifts the balance of Mowrer's learning theory from valuation to cognition, for his position now contains two kinds of conditioning, "emotional" for motivation, and "imaginal" for cognition, which a commitment to parsimony cannot tolerate. Thus, Mowrer takes a second look at the conditioning process itself and, in a highly significant footnote (p. 171), postulates that all conditioning may in the final analysis be imaginal; emotional conditioning would be a derivative form in the sense that a conditioned stimulus does not acquire the capacity to produce an emotional response *directly*, but rather indirectly, by arousing an image of the unconditioned stimulus to which the emotional response is already connected. In this half-page footnote, Mowrer comes nearly full circle to Tolman's cognitive learning theory (or at least to the systematic elaboration of it proposed by MacCorquodale and Meehl).

The convergence with Tolman is further underscored when Mowrer returns to the problem of response selection, left unresolved in Volume I. Here he concludes, as one might expect, that the ability to reproduce a rewarded action on a subsequent occasion is based on the arousal of an image of this action and of its attendant feedback stimuli. But this solution leads Mowrer to the more fundamental question of *image selection, i.e.*, how does the appropriate image arise or, as he puts it, "... in the case of a human being confronted by a particular problem, why do *relevant*, rather than purely random symbols 'occur' to him?" He considers a few possibilities, but seems to favor the notion that images of action as well as images of goals may be conditioned to drives, so that when a drive is subsequently reactivated the appropriate behavioral and goal images are also aroused (and since these images are conditioned to hope, the organism is placed into "more or less appropriate action").

Here, then, is a striking parallel with Tolman's SRS expectancy formula. Mowrer accuses Tolman of leaving the dynamic or motivating element out of this picture, but certainly, in MacCorquodale and Meehl's treatment of *Cathexis, Need Strength* and *Valence*, this feature is very much in evidence, although, to be sure, they have not been so specific as Mowrer about the nature of reinforcement.

Be that as it may, Mowrer, like Tolman and other cognitive theorists before him, is still faced with the *how* of action (*i.e.*, how we get from images of goals and actions to actual behavior). He rather explicitly assumes a supra-ordinate level of chooser or

decision-maker—he is most intent on preserving at least a subjective free will within an otherwise determinate system—but provides no systematic discussion of how this level gets organized, or of how motives are primed within it (what might be called the question of *motive selection*). His treatment of the mechanism of action leans rather heavily on error-actuated cybernetic feedback models. Mowrer quotes extensively from a recent monograph by Powers, Clark and McFarland (1960), wherein a hierarchic assembly of feedback systems is postulated, with higher systems setting "reference levels" (goals) for lower systems. He conjectures that the image of an action as well as the image of positive emotions connected to this action's stimuli would constitute reference levels against which the act is continually monitored. The cyberneticist's machine, however, has a built-in lead which carries reference-input discrepancy signals directly to its motor output. How, in a living organism, does this sort of error-signal, regarded as a cognitive event, get translated into appropriate action? If one is to account for action in other than a reflexive (one- or two-stage) way, another activation principle is needed, which Mowrer does not supply. (The same questions were handled almost identically by Miller, Galanter and Pribram in their book, *Plans and the Structure of Behavior*, published in 1960 by Henry Holt, New York.)

When we move from action to cognition, where Mowrer's system differs terminologically more than substantively from the current two-stage behaviorist position, it is to be expected that he does not add materially to what has already emanated from that source. Consider, for example, Mowrer's rather extended treatment of word meaning.

To those conversant with the literature, it is apparent that Mowrer's analysis of meaning is quite similar to Osgood's neobehaviorist analysis, except that Mowrer substitutes fractional "sensation" for Osgood's fractional "response." Since both constructs are regarded as implicit central reactions, and since both play an identical functional role in each system, it would seem fruitless to argue about who is more nearly correct here. Moreover, as Brown pointed out in his book, *Words and Things* (published in 1958 by The Free Press, Glencoe, Illinois), both positions face more serious problems in accounting, on the one hand, for the meaning of *abstract* terms (where the reference encompasses a range of very dissimilar specific objects), and, on the other, for the meaning of *relational* terms (both concrete and abstract).

Mowrer does not address himself to either of these problems, but the nucleus of an answer to the question of generic concepts is contained in his mechanism of higher order conditioning *via* sentences. This might provide a vehicle for the accretion of a diversity of subordinate specific images to a single superordinate term. (Staats attempted such an analysis in his paper, "Verbal habit-families, concepts and the operant conditioning of word classes," published in the Psychological Review, Vol. 68, pp. 190–204, 1961.) However, the essential meaning of an abstract concept (*i.e.*, what has traditionally been called "connotative" or cognitive meaning) would undoubtedly be mediated not by some sort of abstract or composite image, but by other linguistic mediators which have already been conditioned to more specific images. (Herein may lie the answer to Brown's critique of psychologic theories of meaning.)

The mediator for relational terms has not yet been systematically discussed by psychologists. By virtue of the "transposition" experiments, we know that lower organisms can respond to relations in size, intensity and brightness, so that certain differences between closely presented images are naturally discriminated and mediated. Razran has recently argued ("The observable unconscious and the inferable conscious in current Soviet psychophysiology: Interceptive conditioning, semantic conditioning, and

the orienting reflex," published in the Psychological Review, Vol. 68, pp. 81–147, 1961) that proprioceptive stimulation, which accompanies orienting reactions to conditioned stimuli, may provide the basis for a "suprasensory" coding of more formal properties of stimulation, such as "sequence, number, intensity and duration ratios, rhythm, proximity, similarity," etc., all of which are patently involved in relational discrimination. These factors are currently being explored by Russian psychologists in "configural" conditioning experiments, but this is still very much open territory.

Although it is these kinds of issues that a fully developed cognitive theory must ultimately encompass, one cannot belabor Mowrer for not going deeper than he did. In this book he is more interested in the *breadth* of material his theory can accommodate, and he does indeed range broadly. His text extends from language and meaning to such diverse topics as statistical theory (the viability of which as a method of causative inference he questions) and guilt (where an illuminating analysis based on the mediated fear of being abandoned by a heretofore nurturant parent is presented). There are also penetrating discussions of a propaedeutic nature, particularly those concerned with chance, causation and probability (the last including a cogent analysis of the knotty issue of *maximization* vs. *matching* in probabilistic learning).

Mowrer brings an encyclopedic background to bear on all these topics. His acute awareness of the interpenetration of historical themes gives the book a strong dialectic tone (which tends to become excessive in the frequent insertions of quotations and counterpointing footnotes). If, however, one stays with Mowrer as he poses thesis and counterthesis, a provocative synthesis usually emerges. A concise theoretical summary of the first volume is presented in Chapter I of the present work. One hopes that Mowrer will do the same for his current position (in an introduction to a third volume?).

The present monograph is further testament to the coming of age of behaviorism. In confronting its new outlook with more complexity than heretofore considered, Mowrer has no doubt accelerated its maturation. The work, and the critique it is sure to arouse, converge with a swelling current which contains the potential of a full scientific understanding of almost every facet of human behavior. Psychologists and those in related disciplines are well advised to pay close attention to this dialogue, and might profitably begin with a careful reading of Mowrer's text.

Albert J. Caron

INDEX, VOLUME 133

A

Adams, Raymond D., 358
Addiction, amphetamine, 489
Adjustment and symptom index, an, for objective evaluation of psychotic patients under drug therapy, 399
Adolescents, some notes on the authority structure and the responsibility of in the George Junior Republic, 339
Adult development and the crisis of identification, 425
Aivazian, G. H., 240
Akinetic mutism: Review of the literature and case report, 536
Alcoholism in Twins. Studies on the Etiology and Sequels of Abuse of Alcohol, 272
Allen, J. L., 303
Alt, Herschel, 452
Altered states of consciousness, dreaming and the problem of vigilance, 529
Americans View Their Mental Health, A Nationwide Interview Survey, 449
Amnesia, hypnotically induced, evidence for as an analog of repression, 218
Amphetamine addiction, 489
Amplifying power of causal-correlative greater than that of interrogative inputs on free association in an experimental psychoanalytic situation, 233
Analysis, experimental, of behavior in the first psychiatry course (symposium), 116
Analysis, experimental, of hallucinatory-delusional type of reaction, 69
Analysis of guilt and narcissism, the, 293
Analyzing verbal meanings, method of, 371
Anatomy of Psychotherapy, The 86
Anesthesia, chemical, sequelae to hypnotic induction with special reference to, 461
Angioma in the midbrain and region of the third ventricle, 539
Anxiety in Elementary School Children, 264
Arbona, Luis, 174
Arousal response, electroencephalographic, in depressed patients, longitudinal study of, 524
Arousal responses, photically elicited, observations on duration of in depressive psychoses, 438
Atlas III: Illustrations of the Nervous System, 354
Auld, Frank, Jr., 86
Authority structure and the responsibility of adolescents in the George Junior Republic, some notes on, 339
Autistic children, patterns of pupillary dilatation and constriction in psychotic adults and, 130
Autogenic Training: A Psychophysiologic Approach in Psychotherapy, 554

B

Bacon, Catherine L., 450
Barker, J. C., 346
Barton, Walter E., 558
Basal ganglia, significance of in clinical neurology, 392
Basic Psychiatric Concepts in Nursing, 365
Basilar artery, ischemia in the area of, 540
Bayer, Leona N., 354
Bayley, Nancy 354
Becker, Ernest, 446
Beginning course in psychiatry, contributions of psychology to, 120
Behar, Isaac, 222
Behavior, experimental analysis of in the first psychiatry course (symposium), 116
Behavior therapy in a case of transvestism, 346
Behavioral effects of interrupting and resuming tranquilizing medication among schizophrenics, 303
Bell, D. S., 489
Benda, Clemens E., 367
Bennett, Edward, 447
Bergler, Edmund, 254
Bernstein, Arnold, 86
Biologic tissues, a system for producing a limited, controlled region of cooling or freezing of, cryostatic congelation, 259
Birch, Herbert G., 192
Blackburn, H. L., 303
Blakemore, C. B., 346
Body surface localization in hemiplegic patients. (Perception in hemiplegia, IV), 192
Bortner, Morton 192
Bowers, Mary-Dee, 423
Bowsher, David, 392
Brady, John Paul, 216, 218
Brain
  akinetic mutism: literature review and case report, 536
  basal ganglia, significance of in clinical neurology, 392
  basilar artery, ischemia in the area of, 540
  effects of drug-induced Parkinsonism on psychomotor performance of chronic schizophrenics, 148
  encephalitis 541
  pathologic spectrum of Huntington's chorea, 91
  third ventricle, tumors in relation to, 537

traumatic lesions, 541
Wernicke's encephalopathy, 541
see also midbrain
Brain-damaged and other adults, perception of a three-dimensional spatial incongruity by, 222
Brain dysfunction (particularly temporal lobe dysfunction), relationship of fetishism and transvestism to, 247
Brammer, Lawrence J., 181
Brazier, Mary A. B., 448
Briefly exposed pictures, a method for studying primary-process transformations of (the rebus technique), 479
Brody, Eugene B., 36
Brooks, George W., 148
Bruch, Hilde, 46
Bufotenin-like substance, a, in urine of schizophrenics, 441
Bunney, William E., Jr., 59
Burstein, Alvin, 383
Burgess, Frances, 316, 514
Bylenga, Norma D., 213

C

Caloric stimulation, response of adult schizophrenics to, 104
Canter, Gerald J., 143
Carini, Esta, 176
Cartwright, Dorwin, 560
Case of witchcraft, 161
Causal-correlative inputs, amplifying power of greater than interrogative, on free association in an experimental psychoanalytic situation, 233
Chapanis, A., 455
Chapman, Loren J., 383
Chemical anesthesia, sequelae to hypnotic induction with special reference to, 461
Chemistry of Brain Metabolism in Health and Disease, The, 567
Child with Mongolism (Congenital Acromicria), The, 367
Children, autistic, and psychotic adults, patterns of pupillary dilatation and constriction in, 130
Chlorpromazine and five other phenothiazine compounds, phenobarbital and inert placebo, comparative effectiveness of in the treatment of acutely ill patients, 4
Chlorpromazine, effects of on histamine sensitivity of schizophrenics, 21
Chorea, Huntington's, pathologic spectrum of, 91
Chronic schizophrenics
effects of drug-induced Parkinsonism on psychomotor performance of, 148
anergic, clinical trial of Methastyridone (MK-202) with, 174
Classics in Psychology, 559
Clendening, Logan, 176
Clinical judgment as a disciplined inquiry, 369
Clinical neurology, the significance of the basal ganglia in, 392
Clinical Neurosurgery: Proceedings of the Congress of Neurological Surgeons, Miami Beach, Florida, 1959. Vol. 7, 274
Clinical Psychiatry, 554
Clinical trial of Methastyridone (MK-202) with chronic anergic schizophrenics, 174
Clyde, Dean J., 399
Cohen, Lester, 423
Cohn, Robert, 178
Colby, Kenneth Mark, 233
Cole, Jonathan, 176
Communication and interpersonal contact, 44
Comparative effectiveness of six phenothiazine compounds, phenobarbital and inert placebo in the treatment of acutely ill patients: Global measures of severity of illness, 1
Comparison of physicians' and nurses' symptom ratings, a, 514
Comparison of the performance of student nurses and psychiatric patients on the Edwards' SD Scale, 169
Compulsion to vengeance, the, 300
Concepts, Federn's, and their applicability to the understanding and treatment of schizophrenics, 155
Conceptual confusion in eating disorders, 46
Conceptual problems, some approaches to (Psychiatry and philosophy of science, II), 25
Conceptual rigidity, existential psychiatry as a reaction to, 26
Concise Dictionary of Existentialism, A, 361
Congelation, cryostatic: A system for producing a limited, controlled region of cooling or freezing of biologic tissue, 259
Consciousness, altered states of, dreaming and the problem of vigilance, 529
Constriction and dilatation, pupillary, patterns of in psychotic adults and autistic children, 130
Contextual constraint, role of in the learning of language samples in schizophrenia, 79
Contributions of psychology to the beginning course in psychiatry (symposium), 120
Controls, internal, masochism and homosexuality, 40
Conway, C. G., 346
Cooling or freezing of biologic tissues: Cryostatic congelation, a system for producing a limited, controlled region of, 259
Cooper, Irving S., 259
Covello, Lucio, 360

Crime, psychology of, new approach to, 254
Crises, identification: Schizophrenia and the marital family, 423
Crisis of identification
adult development and, 425
early development and, 423
Cryostatic congelation: A system for producing a limited, controlled region of cooling or freezing of biologic tissue, 259
Current Problems in Phoniatrics and Logopedics, 557
Current Trends in Psychological Theory, 560

D

Daston, Paul G., 222
Davidson, Kenneth S., 264
Day, Dorothy, 383
DeGutierrez-Mahoney, C. G., 176
de La Torre, Rolando, 143
Delusional-hallucinatory type of reaction, experimental analysis of, 69
den Breeijen, Arie, 218
Dennis, Wayne, 560
Depressed patients, longitudinal study of electroencephalographic arousal response in, 524
Depressed women, young, ECT, iproniazid and placebo in treatment of, 316
Depressive psychoses, observations on the duration of photically elicited arousal responses in, 438
Development, early, and the crisis of identification, 423
Development, adult, and the crisis of identification, 425
Diagnosis and sex, an approach to total prevalence of mental disease in an urban population by, 519
Diagnostic technique, a, and a unifying theory of psychodynamics (transformative hypnodynamics), 497
Diagnostic terms, discard of as a solution to conceptual problems, 27
Dilatation and constriction, pupillary, patterns of in psychotic adults and autistic children, 130
Direct Analysis and Schizophrenia, 450
Disability in patients with Parkinson's disease, a method of evaluating, 143
Disciplined inquiry, clinical judgment as a, 369
Disciplined inquiry, similarities of procedures in all, 377
Disease Concept of Alcoholism, The, 457
Disease, Parkinson's, method for evaluating disability in patients with, 143
Di Stefano, A. O., 441
Dollard, John, 86
Dorst, Kate S., 423
Dosage deviations, side-effects and resistance in psychiatric outpatients treated with tranquilizers, 203
Dosage deviations (tranquilizers) and emotional resistance to medication, 207
Dosage (tranquilizers) deviators, extreme, 209
Dreaming, altered states of consciousness and the problem of vigilance, 529
Dreams, hypnotically induced, study of ocular movements in, 59
Drug-induced Parkinsonism, effects of on the psychomotor performance of chronic schizophrenics, 148
Drug therapy, objective evaluation of psychotic patients under: A symptom and adjustment index, 399
Duffey, Robert F., 288
Duration of photically elicited arousal responses in depressive psychoses, observations on, 438
Dynamic Psychiatry in Simple Terms, 2nd ed., 273
Dysraphies de l'Axe Nerveux et de Ses Enveloppes Crânio-Rachidiennes, Les. Etude Critique de Status Dysraphicus, 276

E

Early development and the crisis of identification, 423
Eating disorders, conceptual confusion in, 46
Eaton, Lee M., 358
ECT therapy, iproniazid and placebo, efficacy of in the treatment of young depressed women, 316
Education, medical, evaluation in: Discussion (symposium), 126
Education, medical undergraduate, psychologist in (symposium), 108
Edwards' SD Scale, comparison of the performance of student nurses and psychiatric patients on the, 169
Effects of drug-induced Parkinsonism on the psychomotor performance of chronic schizophrenics, 148
Efficacy of electroconvulsive therapy, iproniazid and placebo in the treatment of young depressed women, 316
Ego in Love and Sexuality, The, 456
Ekman, Paul, 229
Electrical Activity of the Nervous System, The, 2nd ed., 448
Electroconvulsive therapy, iproniazid and placebo, efficacy of in the treatment of young depressed women, 316
Electroencephalogram, use of in a study of ocular movements in hypnotically induced dreams, 59
Electroencephalographic arousal response in depressed patients, longitudinal study of, 524

Electroencephalographic correlates, Librium (chlordiazepoxide) therapy and, 240
Electroencephalography
fourteen and six psychopathy, 434
photically elicited arousal responses, duration of in depressive psychoses, 438
Elettromiografia Clinica, 360
Elwood, David L., 79
Emotional resistance to medication and dosage deviations, 207
Encephalitis, 541
Encephalopathy, Wernicke's, 541
English, O. Spurgeon, 450
Epilepsy, murder or? 430
Epilepsy, psychomotor, 431
Epstein, Arthur W., 247
Error and Deception in Science, 178
Escalona, Sibylle, 454
Essentials of Neurosurgery for Students and Practitioners, 453
Etryptamine acetate (Monase), memory function of patients taking, 213
Evaluation in medical education: Discussion (symposium), 126
Evaluation, objective, of psychotic patients under drug therapy: A symptom and adjustment index, 399
Evidence for hypnotically induced amnesia as an analog of repression, 218
Existential psychiatry as a reaction to conceptual rigidity, 26
Experimental analysis of behavior in the first psychiatry course (symposium), 116
Experimental analysis of the hallucinatory-delusional type of reaction, 69
Experimental Psychology: A Methodological Approach, 360
Expressed fear of hypnosis and volunteering behavior, 216
Extrapyramidal system
basal ganglia, significance of in clinical neurology, 392
effects of drug-induced Parkinsonism on psychomotor performance of chronic schizophrenics, 148

F

Family, marital, schizophrenia and the: Identification crises, 423
Family structure, pre-morbid adjustment and: A comparison of selected rural and urban schizophrenic men, 333
Farrell, Malcolm J., 558
Fear of hypnosis, expressed, and volunteering behavior, 216
Feather, Ben W., 25
Featherstone, Robert M., 176
Federn's concepts and their applicability to the understanding and treatment of schizophrenics, 155
Fellner, Carl H., 55
Fetishism and transvestism, relationship of to brain and particularly to temporal lobe dysfunction, 247
Feld, Sheila, 449
Ferster, C. B., 116
Fey, Elizabeth T., 124
Fey, William F., 124
Fischer, E., 441
FitzGerald, Joseph, 218
Five introductions to psychiatry (symposium), 124
Five-year follow-up study, intensive, of treated psychiatric outpatients, 410
Fourteen and six psychopathy, 434
Frank, Jerome D., 410, 561
Free association in an experimental psychoanalytic situation, on the greater amplifying power of causal-correlative over interrogative inputs on, 233
Freedman, Daniel X., 59
Freezing or cooling of biologic tissues: Cryostatic congelation, a system for producing a limited, controlled region of, 259
Fried, Edrita, 456
Friedhoff, Arnold J., 104
Freud's theory of psychosis and the role of the psychotherapist, 36

G

Galvin, James A. V., 161
George Junior Republic, some notes on the authority structure and the responsibility of adolescents in, 339
Gerard, Ralph, 176
Gods of Love, The: The Creative Process in Early Religion, 276
Gorlin, Morris, 448
Gottlieb, Gilbert, 524
Greek Culture and the Ego, 445
Gross, Martin, 399
Growth Diagnosis, 354
Guilt and narcissism, the analysis of, 293
Guilt by loose analogy, 281
Gurin, Gerald, 449

H

Hallman, Ralph J., 556
Hallucinatory-delusional type of reaction, experimental analysis of, 69
Hampe, Warren W., 450
Handbook of Research Methods in Child Development, 267
Hanlon, Thomas E., 1
Hartmann-von Monakow, Kurt, 354

Hausman, Louis, 354
Haworth, Mary R., 265
Heaton-Ward, W. Alan, 357
Heider, Grace Moore, 454
Hemiplegia, perception in: IV. Body surface localization in hemiplegic patients, 192
Hendin, Helen C., 86
Hilgard, Ernest R., 461
Hilgard, Josephine R., 461
Hine, Frederick R., 25
Histamine wheal formation and mental illness, 19
Hitchman, Irene L., 399
Hofling, Charles K., 365
Holt, Robert R., 369
Homosexuality and hostility, 41
Homosexuality, internal controls and masochism, 40
Hostility and homosexuality, 41
Hull, R. F. C., 180
Huntington's chorea, pathologic spectrum of, 91
Hypnodynamics, transformative: A diagnostic technique and a unifying theory of psychodynamics, 497
Hypnosis, expressed fear of, and volunteering behavior, 216
Hypnotic induction, sequelae to, with special reference to earlier chemical anesthesia, 461
Hypnotically induced amnesia, evidence for as an analog of repression, 218
Hypnotically induced dreams, study of ocular movements in, 59

I

Identification crises: Schizophrenia and the marital family, 423
Identification, crisis of, adult development and, 425
Identification, crisis of, early development and 423
Imber, Stanley D., 410
Imipramine hydrochloride, effects of on histamine sensitivity of schizophrenics, 21
Impressions of European Psychiatry, 558
Incongruity, three-dimensional spatial, perception of by brain-damaged and other adults, 222
Inputs, causal-correlative, amplifying power of greater than that of interrogative on free association in an experimental psychoanalytic situation, 233
Inquiry, disciplined, clinical judgment as a, 369
Inquiry, disciplined, similarities of procedures in all, 377
Intensive five-year follow-up study of treated psychiatric outpatients, an, 410
Interrogative inputs, amplifying power of causal-correlative inputs greater than, on free association in an experimental psychoanalytic situation, 233
Interrupting and resuming tranquilizing medication among schizophrenics, behavioral effects of, 303
Intertrial intervals, preparatory and, reaction time in schizophrenic and normal subjects as a function of, 283
Introduction to Electronics for Physiological Workers, An, 2nd ed., 273
Introduction to Social Psychiatry, An, 365
Iproniazid, electroconvulsive therapy and placebo, efficacy of in the treatment of young depressed women, 316
Ischemia in area of supply of the basilar artery, 540

J

Jaco, E. Gartly, 357
Janzen, Arnold H., 277
Jellinek, E. M., 457
Johns, Ethel, 366
Judgment, clinical, as a disciplined inquiry, 369

K

Kaij, Lennart, 272
Kass, Walter, 109
Klee, Axel, 536
Kline, Nathan S., 19
Knobel, Mauricio, 309
Knopf, Irwin J., 120
Kohrman, Robert, 271
Kolle, Kurt, 558
Kubie, Lawrence S., 281
Kurland, Albert A., 1, 174

L

Lagravere, T. A. Fernández, 441
Language samples, role of contextual constraint in the learning of in schizophrenia, 79
La Torre, de, Rolando, 143
Lavin, N. I., 346
Lawrence, Jordan, 399
Learning of language samples in schizophrenia, role of contextual constraint in, 79
Learning Theory and the Symbolic Processes, 568
Lee, Arnold St. J., 259
Leighton, Alexander H., 365
Leininger, Madeleine M., 365
Lenehan, Frances T., 558
Lennard, Henry L., 86
Levitt, Eugene E., 216, 218
Lewinsohn, Peter M., 79
Librium therapy and electroencephalographic correlates, 240
Lichtenberg, Philip, 271
Lightall, Frederick F., 264

Livermore, Nancy 316
Livson, Florine, 423
Localization, body surface, in hemiplegic patients, 192
Longitudinal study of the electroencephalographic arousal response in depressed patients, 524
Longworth, Clifton T., 276
Lubin, Bernard, 108, 216
Luborsky, Lester, 479
Ludwig, Arnold M., 161
Luthe, Wolfgang, 554

M

MacGregor, Helen, 271
Maimonides' On Sexual Intercourse, 448
Marconi, Juan, 69
Marital family, schizophrenia and the: Identification crises, 423
Martineau, Paul, 339
Martyrdom thrill, the, 298
Masochism, internal controls and homosexuality, 40
May, Rupert H., 213
Mayer-Gross, W., 554
McGaughey, William T. E., 91
McCusker, Kenneth, 174
McGuigan, Frank J., 360
McLaughlin, William F., 558
Meanings, verbal, method of analyzing, 371
Medical education, evaluation in: Discussion (symposium), 126
Medical education, undergraduate, psychologist in (symposium), 108
Medical students, preclinical teaching of psychiatry to, psychologists' participation in, 109
Memory function of patients taking etryptamine acetate (Monase), 213
Mensh, Ivan N., 126
Mental disease, survey of in an urban population: V. An approach to total prevalence by diagnosis and sex, 519
Mental Health, The Nurse and The Patient, 366
Mental illness, histamine wheal formation and, 19
Mental Subnormality: Subnormality and Severe Subnormality, 357
Mepazin and five other phenothiazine compounds, phenobarbital and inert placebo, comparative effectiveness of in the treatment of acutely ill patients, 4
Meprobamate, effects of on histamine sensitivity of schizophrenics, 21
Messinger, Sheldon L., 423
Methastyridone (MK-202), Clinical trial of with chronic anergic schizophrenics, 174
Method for evaluating disability in patients with Parkinson's disease, 143
Method for studying primary-process transformations of briefly exposed pictures (the rebus technique), 479
Method of analyzing verbal meanings, 371
Mezer, Robert R., 273
Michaux, William W., 203
Midbrain and region of the third ventricle, angioma in, 539
Midbrain, solitary metastasis in the midline of, 539
Mier, Manuel, 143
Monase (etryptamine acetate), memory function of patients taking, 213
Mostly Murder, 445
Motivation for Child Psychiatry Treatment, 271
Mowrer, O. Hobart, 568
Mullan, Sean, 453
Muñoz, Liliana, 69
Murder or epilepsy? 430
Mussen, Paul Henry, 267
Mutism, akinetic: Review of the literature and case report, 536

N

Narcissism, the analysis of guilt and, 293
Narcoleptics, trancelike attacks in, 543
Nash, Earl H., 410
Neglected Areas in Family Living, 361
Neumann, Erich, 180
Neurological and Neurosurgical Nursing, 176
Neurology, clinical, the significance of the basal ganglia in, 392
Neuromuscular Disorders: The Motor Unit and its Disorders (Proceedings of the Association for Research in Nervous and Mental Disease, Vol. 38), 358
New approach to the psychology of crime, 254
Newell, Pauline C., 399
Newman, Martha, 461
Nicholas, Alma L., 169
Normal Skull, The, A Roentgen Study, 277
Nurses' and physicians' symptom ratings, a comparison of, 514
Nurses, student, and psychiatric patients, comparison of the performance of on the Edwards' SD Scale, 169

O

Objective estimation of visual acuity in psychiatric patients, 185
Objective evaluation of psychotic patients under drug therapy: A symptom and adjustment index, 399
Observations on the duration of photically elicited arousal responses in depressive psychoses, 438
Ocular movements, study of in hypnotically induced dreams, 59

Odlum, Doris, 366
On the greater amplifying power of causal-correlative over interrogative inputs on free association in an experimental psychoanalytic situation, 233
Ordy, J. Mark, 185
Origin and History of Consciousness, The, 180
Ota, Kay Y., 1
Outpatients, psychiatric, treated with tranquilizers, side-effects, resistance and dosage deviations in, 203
Outpatients, treated psychiatric, an intensive five-year follow-up study, 410
Ovsiankina, Maria A. Rickers—; *see* Rickers-Ovsiankina, Maria A.,

P

Palmore, Erdman B., 86
Parkinsonism, drug-induced, effects of on the psychomotor performance of chronic schizophrenics, 148
Parkinson's disease, method for evaluating disability in patients with, 143
Parkinson-Syndrom, Das, 354
Pasamanick, Benjamin, 519
Pathologic spectrum of Huntington's chorea, 91
Patients, psychotic, under drug therapy, objective evaluation of: A symptom and adjustment index, 399
Patients taking etryptamine acetate (Monase), memory function of, 213
Patterns of pupillary dilatation and constriction in psychotic adults and autistic children, 130
Paulson, George W., 524
Perception by patient of his illness, relationship between type of therapy received and, 288
Perception in hemiplegia: IV. Body surface localization in hemiplegic patients, 192
Perception of a three-dimensional spatial incongruity by brain-damaged and other adults, 222
Perphenazine and five other phenothiazine compounds, phenobarbital and inert placebo comparative effectiveness of in the treatment of acutely ill patients, 4
Persky, Harold, 218
Personality Assessment and Diagnosis: A Clinical and Experimental Technique, 447
Person Symbol in Clinical Medicine, The: A Correlation of Picture Drawings with Structural Lesions of the Brain, 178
Persuasion and Healing: A Comparative Study of Psychotherapy, 561
Pharmacologic Approach to the Study of the Mind, A, 176
Phenothiazine compounds, comparative effectiveness of six, phenobarbital and inert placebo in the treatment of acutely ill patients: Global measures of severity of illness, 1
Philosophy of science, psychiatry and. II: Some approaches to conceptual problems, 25
Photically elicited arousal response in depressive psychoses, observations on duration of, 438
Physicians' and nurses' symptom ratings, a comparison of, 514
Pictures, briefly exposed, a method for studying primary-process transformations of (the rebus technique), 479
Pittenger, Robert E., 339
Plante, Marc, 316, 514
Pomerans, A. J., 178
Preclinical teaching of psychiatry to medical students, psychologists' participation in, 109
Prediction and Outcome: A Study in Child Development, 454
Prediction, the role of, 379
Pre-morbid adjustment and family structure: A comparison of selected rural and urban schizophrenic men, 333
Preparatory and intertrial intervals, reaction time in schizophrenic and normal subjects as a function of, 283
Prevalence, total, of mental disease in an urban population by diagnosis and sex, an approach to, 519
Primary-process transformations of briefly exposed pictures, a method for studying (the rebus technique), 479
Problems, conceptual, some approaches to. Psychiatry and philosophy of science. II:, 25
Process-reactive distinction, the, and prognosis in schizophrenia, 383
Prochlorperazine and five other phenothiazine compounds, phenobarbital and inert placebo, comparative effectiveness of in the treatment of acutely ill patients, 4
Prochlorperazine, effects of on histamine sensitivity of schizophrenics, 21
Proctor, Florry, 192
Prognosis in schizophrenia, the process-reactive distinction and, 383
Projective Techniques with Children, 265
Promazine and five other phenothiazine compounds, phenobarbital and inert placebo, comparative effectiveness of in the treatment of acutely ill patients, 4
Provocation of suicidal attempts, 55
Psychiatric Aide, The: A Textbook of Patient Care, 2nd ed., 277
Psychiatric outpatients treated, an intensive five-year follow-up study, 410
Psychiatric outpatients treated with tran-

quilizers, side-effects, resistance and dosage deviations in, 203
Psychiatric patients and student nurses, comparison of the performance of on the Edwards' SD Scale 169
Psychiatric patients, objective estimation of visual acuity in, 185
Psychiatric research, reliability of diagnostic and other class terms a neglected step in, 30
Psychiatrie: Ein Lehrbuch Fur Studierende und Arzte, 558
Psychiatry and philosophy of science. II: Some approaches to conceptual problems, 25
Psychiatry, contributions of psychology to the beginning course in (symposium), 120
Psychiatry course, first, experimental analysis of behavior in (symposium), 116
Psychiatry, five introductions to (symposium), 124
Psychiatry, psychologists' participation in preclinical teaching of to medical students (symposium), 109
Psychoanalytic situation, experimental, on the greater amplifying power of causal-correlative over interrogative inputs, on free association in, 233
Psychodynamics of psychopharmacology, 309
Psychodynamics, a unifying theory of and a diagnostic technique (transformative hypnodynamics), 497
Psychologist in undergraduate medical education (symposium), 108
Psychologists' participation in preclinical teaching of psychiatry to medical students (symposium), 109
Psychology, contributions of to the beginning course in psychiatry (symposium), 120
Psychology of crime, new approach to, 254
Psychology of Literature: A Study of Alienation and Tragedy, 556
Psychomotor epilepsy, 431
Psychomotor performance of chronic schizophrenics, effects of drug-induced Parkinsonism on the, 148
Psychopathy, 14 and 6 per second, 434
Psychopharmacology
amphetamine addiction, 489
chlorpromazine, 4
chlorpromazine, effects of on histamine sensitivity of schizophrenics, 21
drug therapy, objective evaluation of psychotic patients under: Symptom and adjustment index, 399
imipramine hydrochloride, effects of on histamine sensitivity of schizophrenics, 21
Librium (chlordiazepoxide) therapy and EEG correlates, 240
mepazine, 4
meprobamate, effects of on histamine sensitivity of schizophrenics, 21
Methastyridone (MK-202), clinical trial of with chronic anergic schizophrenics, 174
Monase (etryptamine acetate), memory function of patients taking, 213
perphenazine, 4
prochlorperazine, 4
prochlorperazine, effects of on histamine sensitivity of schizophrenics, 21
promazine, 4
psychodynamics of, 309
relationship between type of therapy received and patient's perception of his illness, 288
reserpine, effects of on histamine sensitivity of schizophrenics, 21
tranquilizers, side-effects, resistance and dosage deviations in psychiatric outpatients treated with, 203
tranquilizers' side-effects as function of pretreatment attitude to medication, 206
tranquilizing medication among schizophrenics, behavioral effects of interrupting and resuming, 303
trifluprornazine, 4
Psychopharmacology: Problems in Evaluation, 176
Psychoses, depressive, observations on the duration of photically elicited arousal responses in, 438
Psychosis, context of and reality, 42
Psychosis, Freud's theory of and the role of the psychotherapist, 36
Psychotherapy of Schizophrenia, A: Direct Analysis, 362
Psychotherapy Relationship, The, 355
Psychotic adults and autistic children, patterns of pupillary dilatation and constriction in, 130
Psychotic patients under drug therapy, objective evaluation of: A symptom and adjustment index, 399
Pupillary dilatation and constriction, patterns of in psychotic adults and autistic children, 130

Q

Quastel, David M. J., 567
Quastel, J. H., 567
Query, Joy M. Neale, 333

R

Rabin, Albert I., 265
Rapaport, David, 82
Ratings of symptoms, a comparison of physicians' and nurses', 514
Reaction time in schizophrenic and normal

subjects as a function of preparatory and intertrial intervals, 283
Real Bohemia, The, 277
Reality and the context of psychosis, 42
Reboton, Jose R., Jr., 185
Rebus technique: A method for studying primary-process transformations of briefly exposed pictures, 479
Reeves, Walter P., 399
Rejection compulsion, the, 296
Relatedness, human, and the schizophrenic person, 38
Relationship between type of therapy received and a patient's perception of his illness, 288
Relationship of fetishism and transvestism to brain and particularly to temporal lobe dysfunction, 247
Reliability of diagnostic and other class terms: A neglected step in psychiatric research, 30
Repression, evidence for hypnotically induced amnesia as an analog of, 218
Research as therapy? 229
Research Techniques in Human Engineering, 455
Reserpine, effects of on histamine sensitivity of schizophrenics, 21
Residential Treatment for the Disturbed Child, 452
Resistance, side-effects and dosage deviations in psychiatric outpatients treated with tranquilizers, 203
Response of adult schizophrenics to caloric stimulation, 104
Responses, arousal, photically elicited, observations on duration of in depressive psychoses, 438
Reznikoff, Marvin, 169
Richman, Joseph, 109
Rickers-Ovsiankina, Maria A., 266
Rigidity, conceptual, existential psychiatry as a reaction to, 26
Rigney, Francis J., 277
Robinson, Alice M., 277
Role of contextual constraint in the learning of language samples in schizophrenia, 79
Role of prediction, the, 379
Rorschach Psychology, 266
Rosenblum, William I., 104
Rosenthal, David, 283
Ross, David, 423
Rostand, Jean, 178
Roth, Martin, 554
Rubin, Leonard S., 130
Ruebush, Britton K., 264
Rural and urban schizophrenic men, comparison of (pre-morbid adjustment and family structure), 333

S

Sampson, Harold, 423
Sarason, Seymour B., 264
Scheflen, Albert E., 362
Schiff, Sheldon K., 59
Schizophrenia
process-reactive distinction and prognosis in, 383
and the marital family: Identification crises, 423
role of contextual constraint in the learning of language samples in, 79
Schizophrenic and normal subjects, reaction time in as a function of preparatory and intertrial intervals, 283
Schizophrenic men, a comparison of selected rural and urban: Pre-morbid adjustment and family structure, 333
Schizophrenic person and human relatedness, 38
Schizophrenics
adult, response of to caloric stimulation, 104
behavioral effects of interrupting and resuming tranquilizing medication among, 303
chronic anergic, clinical trial of Methastyridone (MK-202) with, 174
chronic, effects of drug-induced Parkinsonism on the psychomotor performance of, 148
Federn's concepts and their applicability to the understanding and treatment of, 155
urine of, a bufotenin-like substance in, 441
Schultz, Johannes H., 554
Science, psychiatry and philosophy of. II: Some approaches to conceptual problems, 25
Scoring Human Motives. A Manual, 86
SD (social desirability) scale, Edwards', comparison of student nurses' and psychiatric patients' performance on, 169
Sequelae to hypnotic induction with special reference to earlier chemical anesthesia, 461
Serra, Carlo, 360
Settlage, Calvin F., 450
Sex and diagnosis, an approach to total prevalence of mental disease in an urban population by, 519
Shakow, David, 283
Shapiro, Robert, 277
Shevrin, Howard, 479
Shipley, Thorne, 559
Shostrom, Everett L., 181
Shy, G. Milton, 358
Side-effects, resistance and dosage deviations in psychiatric outpatients treated with tranquilizers, 203
Side-effects (tranquilizers)
and presenting complaints, relations between, 206
as function of pretreatment attitude to medication, 206
incidence and intercorrelations, 204

Significance of the basal ganglia in clinical neurology, 392
Sillman, Leonard R., 293
Simon, Alexander, 176
Simopoulos, Aris M., 1
Simpson, George M., 19
Slater, Eliot, 554
Sleep and post-hypnotically suggested dreams, 65
Smith, L. Douglas, 277
Smith, Sir Sydney, 445
Snyder, B. June, 355
Snyder, William U., 355
Social Epidemiology of Mental Disorders, The 357
Some notes on the authority structure and the responsibiliy of adolescents in the George Junior Republic, 339
Source Book of Medical History, 176
Spatial incongruity, three-dimensional, perception of by brain-damaged and other adults, 222
Stimulation, caloric, response of adult schizophrenics to, 104
Stokes, Adrian, 445
Stone, Anthony R., 410
Structure of Psychoanalytic Theory, The: A Systematizing Attempt, 82
Student nurses and psychiatric patients, comparison of performance of on Edwards' SD scale, 169
Study of ocular movements in hypnotically induced dreams, a, 59
Suicidal attempts, provocation of, 55
Sullenger, Thomas Earl, 361
Survey of mental disease in an urban population, a: V. An approach to total prevalence by diagnosis and sex, 519
Symposium: The psychologist in undergraduate medical education, 108
Symptom and adjustment index, a, for objective evaluation of psychotic patients under drug therapy, 399
Symptom ratings, a comparison of physicians' and nurses', 514

T

Tatom, Mary H., 1
Temporal lobe dysfunction, relationship of fetishism and transvestism to brain and particularly to, 247
Theoretical and Practical Problems of Medicine and Biology in Experiments on Monkeys, 275
Therapeutic Psychology: Fundamentals of Counseling and Psychotherapy, 181
Therapy, drug, objective evaluation of psychotic patients under: A symptom and adjustment index, 399
Therapy, Librium, and EEG correlates, 240
Therapy, research as? 229
Therapy, type of, and patient's perception of his illness, relationship between, 288
Thorpe, J. G., 346
Thurrell, Richard J., 124
Tien, H. C., 497
Total prevalence of mental disease in an urban population by diagnosis and sex, an approach to, 519
Towne, Robert D., 423
Tranquilizers, side-effects, resistance and dosage deviations in psychiatric outpatients treated with, 203
Tranquilizing medication, behavioral effects of interrupting and resuming among schizophrenics, 303
Transformative analysis, 505
Transformative hypnodynamics: A diagnostic technique and a unifying theory of psychodynamics, 497
Transformativity, the theory of, 503
Transvestism and fetishism, relationship of to brain and particularly to temporal lobe dysfunction, 247
Transvestism, behavior therapy in a case of, 346
Treated psychiatric outpatients, an intensive five-year follow-up study, 410
Trethowan, W. H., 489
Tridon, P., 276
Trifluprom azine and five other phenothiazine compounds, phenobarbital and inert placebo, comparative effectiveness of in the treatment of acutely ill patients, 4
Trojan, F., 557
Tumors in relation to the third ventricle, 537

U

Ullman, Montague, 529
Unifying theory of psychodynamics, a, and a diagnostic technique (transformative hypnodynamics), 497
Urban and rural schizophrenic men, comparison of (pre-morbid adjustment and family structure), 333
Urban population, survey of mental disease in: V. An approach to total prevalence by diagnosis and sex, 519
Urine of schizophrenics, a bufotenin-like substance in, 441
Utkin, I. A., 275

V

Vázquez, A. J., 441
Vengeance compulsion, the, 300
Verbal meanings, method of analyzing, 371
Veroff, Joseph, 449
Vigilance, the problem of, dreaming and altered states of consciousness, 529

Visual acuity, objective estimation of in psychiatric patients, 185
Volunteering behavior, expressed fear of hypnosis and, 216

W

Waite, Richard R., 264
Walker, A. Earl, 430
Weaver, Lelon A., Jr., 148
Weiss, Edoardo, 155
Wernicke's encephalopathy, 541
Whitfield, I. C., 273
Whitman, James R., 288
Wilson, N. J., 438
Wilson, W. P., 438
Winfield, Don L., 240
Winn, Ralph R., 361
Witchcraft, a case of, 161
Wittenborn, J. R., 316, 514

Y

Young depressed women, ECT, iproniazid and placebo in treatment of, 316
Yudelevich, Raquel, 69

Z

Zahn, Theodore P., 283
Zen: A Rational Critique, 446

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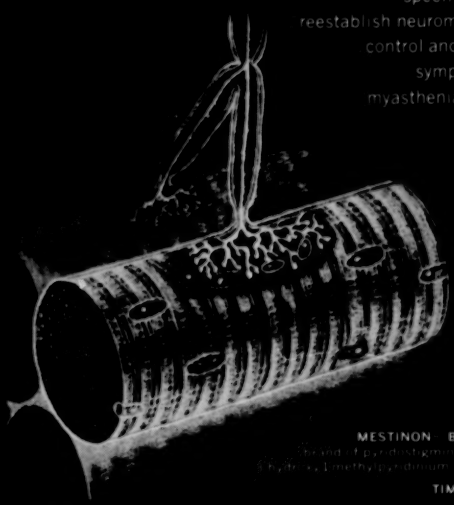

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Table of Contents

SEQUELAE TO HYPNOTIC INDUCTION WITH SPECIAL REFERENCE TO EARLIER CHEMICAL ANESTHESIA. *Josephine R. Hilgard, Ernest R. Hilgard and Martha Newman* 461

THE REBUS TECHNIQUE: A METHOD FOR STUDYING PRIMARY-PROCESS TRANSFORMATIONS OF [BRIEFLY EXPOSED PICTURES. *Howard Shevrin and Lester Luborsky* 479

AMPHETAMINE ADDICTION. *D. S. Bell and W. H. Trethowan* 489

TRANSFORMATIVE HYPNODYNAMICS: A DIAGNOSTIC TECHNIQUE AND A UNIFYING THEORY OF PSYCHODYNAMICS. *H. C. Tien* 497

A COMPARISON OF PHYSICIANS' AND NURSES' SYMPTOM RATINGS. *J. R. Wittenborn, Marc Plante and Frances Burgess* 514

A SURVEY OF MENTAL DISEASE IN AN URBAN POPULATION. V: AN APPROACH TO TOTAL PREVALENCE BY DIAGNOSIS AND SEX. *Benjamin Pasamanick* 519

A LONGITUDINAL STUDY OF THE ELECTROENCEPHALOGRAPHIC AROUSAL RESPONSE IN DEPRESSED PATIENTS. *George W. Paulson and Gilbert Gottlieb* 524

DREAMING, ALTERED STATES OF CONSCIOUSNESS AND THE PROBLEM OF VIGILANCE. *Montague Ullman* 529

AKINETIC MUTISM: REVIEW OF THE LITERATURE AND REPORT OF A CASE. *Axel Klee* 536

BOOK REVIEWS 554

INDEX 573

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